

An Introduction to California's Ocean Observing Systems

How to use ocean observing system data
related to water quality assessment

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www.sccoos.org



Sept. 24, 2012



Introduction Outline

- What is U.S. IOOS®?
- What are CeNCOOS and SCCOOS?
- How are we funded?
- What do we do?
- How does it apply to water quality in California?
- What's in store for the future?



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What is U.S. IOOS?

- US contribution to Global Ocean Observing System
- Program Office in D.C. within NOS / NOAA
- Includes global (satellites, drifters, etc.) and coastal components
- Coastal component includes 17 Federal agencies, 11 regional associations and 2 other consortia
- Federal backbone of coastal component includes tide gauges, NDBC buoys, etc.



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Purpose of U.S. IOOS

A tool that enables the Nation to track, predict, manage and adapt to changes in our ocean, coastal and Great Lakes environment for the purposes of:

Improving safety Enhancing our economy Protecting our environment

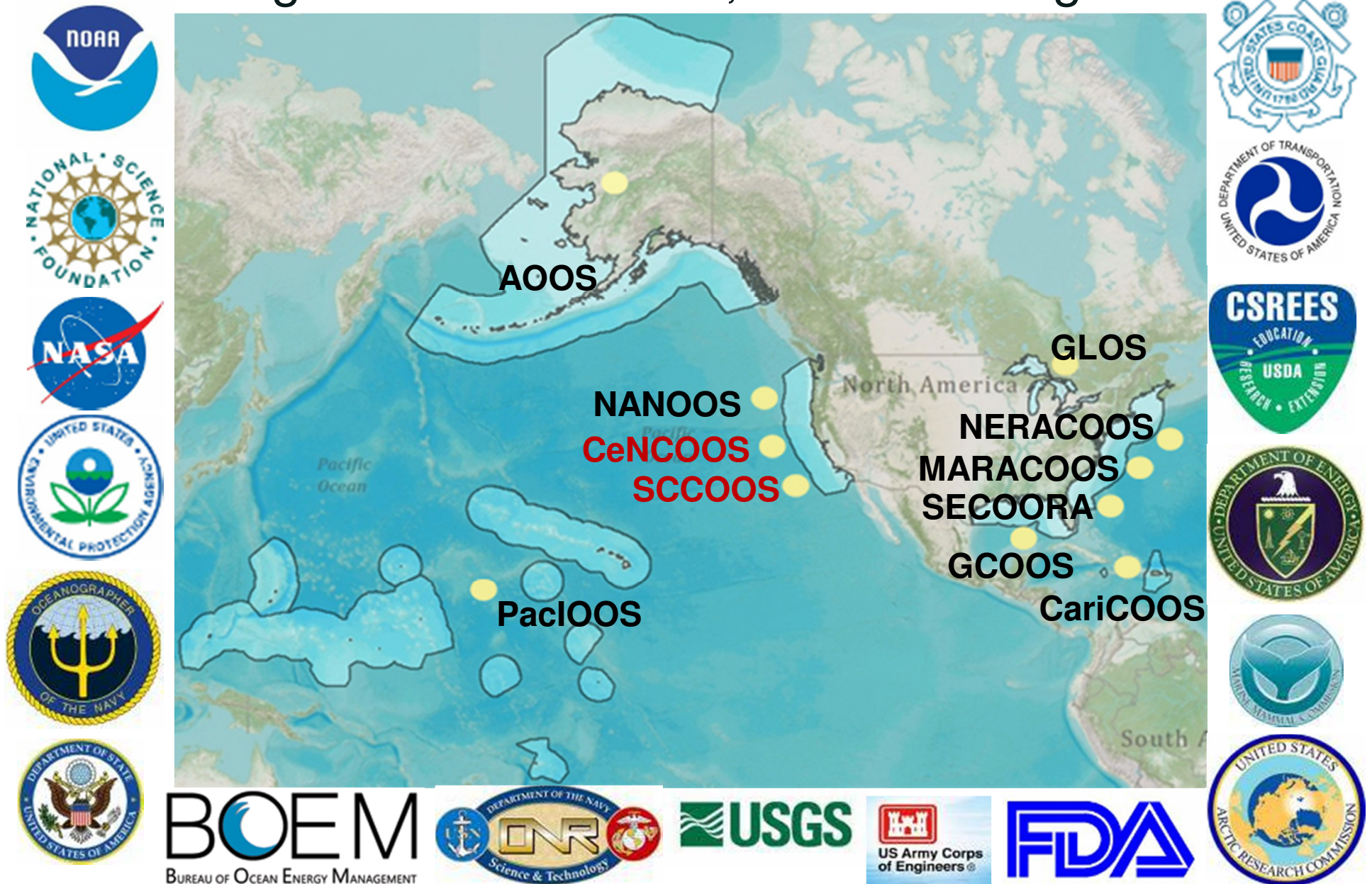


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IOOS Coastal Component

11 Regional Associations; 17 Federal Agencies



What are CeNCOOS and SCCOOS?

- CeNCOOS www.CeNCOOS.org
 - Central and Northern California Ocean Observing System
 - Extends from Pt Conception to OR border
 - Program Office at MBARI, Moss Landing
 - 48 member organizations
- SCCOOS www.SCCOOS.org
 - Southern California Coastal Ocean Observing System
 - Extends from Pt Conception to Mexican border
 - Program Office at Scripps Inst. of Oceanography, San Diego
 - 11 member organizations



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What are CeNCOOS and SCCOOS?

- They support Principal Investigators at institutions throughout the state who operate the observing system
- They each have a governing body
 - CeNCOOS: 15 member elected Governing Council
 - SCCOOS: 10 member Board of Governors
- They share a 33-member Joint Strategic Advisory Committee linking them with broad stakeholder interests and knowledge within California



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CeNCOOS and SCCOOS Program Office Staffs

- **CeNCOOS**

- Director: Leslie Rosenfeld (60% time, started 9/11)
- Program Manager: Janine Scianna (90%, 1/12)
- Information Manager: Jennifer Patterson (90%, 4/12)
- Product Developer: Fred Bahr (50%, 10/08)

- **SCCOOS**

- Director: Julie Thomas (25%, 1/08)
- Program Coordinator: Danielle Williams (100%, 5/12)
- Data & Information Manager: Lisa Hazard (30%, 2/05)
- Public & Government Relations Coordinator: Chris Cohen (40%, 2/10)
- Technical Director: Eric Terrill (10%, 2/05)



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How are CeNCOOS and SCCOOS funded?

- Primary funding is via 5-year grant from NOAA IOOS
 - Year 1 (6/11-5/12): ~\$1.75M to each of SCCOOS and CeNCOOS
 - Year 2 (6/12-5/13): ~\$2.1M to each of SCCOOS and CeNCOOS
 - Year 3 (6/13-7/14): ?????????
- Other smaller current and anticipated funding sources include:
 - NOAA HABs (CeNCOOS and SCCOOS)
 - OCSD (SCCOOS; CeNCOOS in future)
 - Deepwater Desal (CeNCOOS)
 - ASBS (SCCOOS)
 - CA Dept. of Boating & Waterways (SCCOOS Manual Shore Program)
- In the past, significant funding came from:
 - California State Coastal Conservancy



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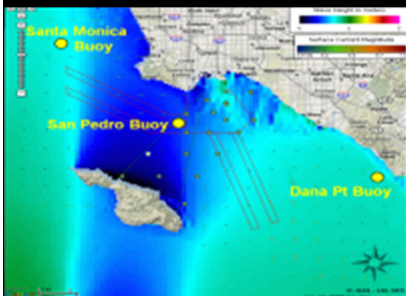
What do CeNCOOS and SCCOOS do?

Manage an “end-to-end” coastal ocean observing system ...

- data collection
- data management
- data dissemination
- numerical model simulations and forecasts
- product development
- user outreach and facilitation

... to benefit USERS in four broad focus areas:

- Water quality
- Ecosystems and climate
- Marine operations
- Coastal hazards



What do CeNCOOS and SCCOOS do?

The foundation is a network of ocean observing **assets** → that measure:

- Physical and chemical properties (e.g. temperature, salinity, dissolved oxygen)
- Biological properties (e.g. Harmful Algal Blooms, chlorophyll fluorescence)
- Waves
- Meteorological conditions
- Surface currents

Observational assets include:

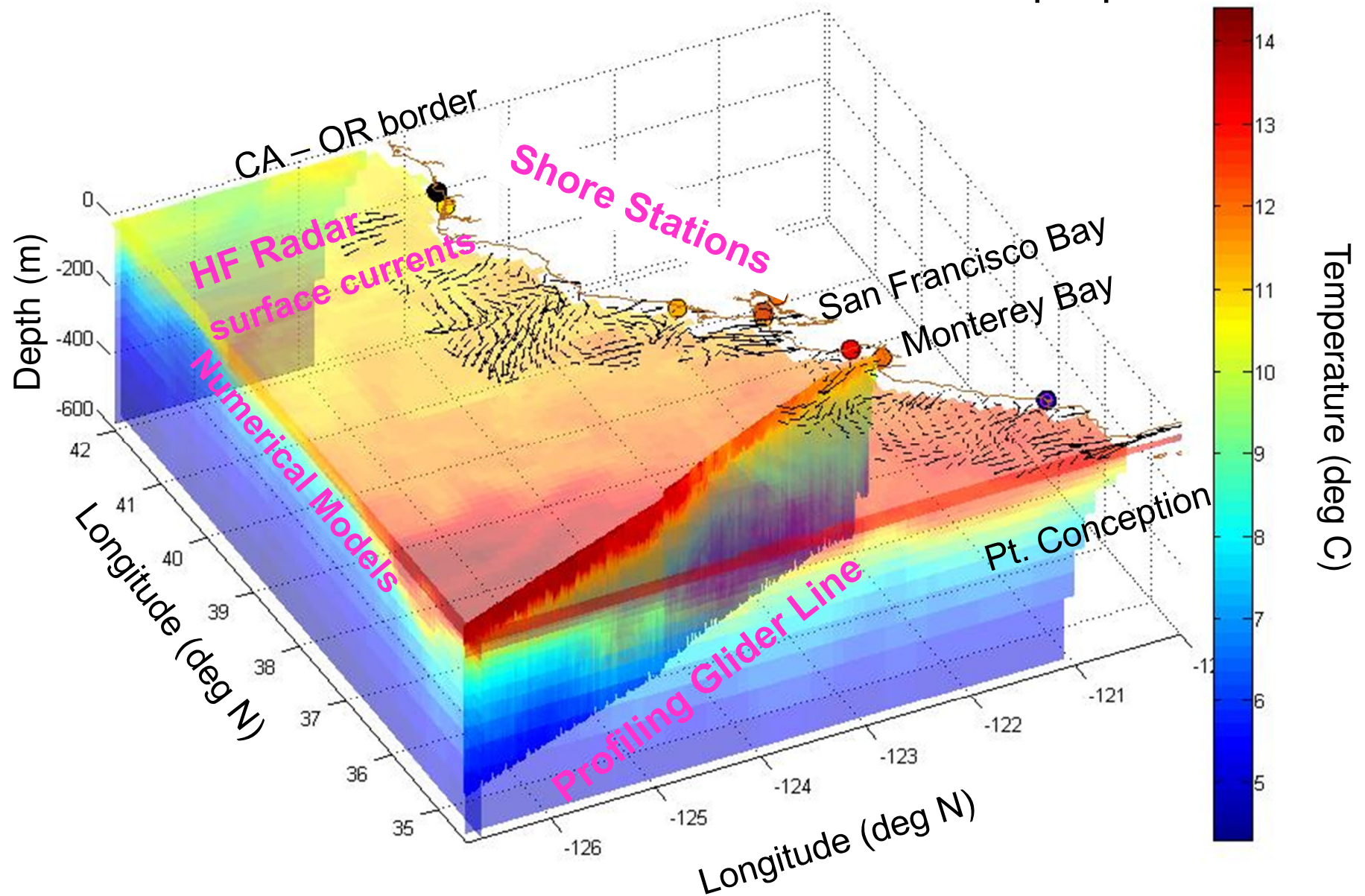
- Shore stations
- Gliders
- Moored buoys
- Land-based high frequency radar stations
- Ship-based surveys



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The result is an integrated picture of the ocean environment that is useful for a multitude of purposes

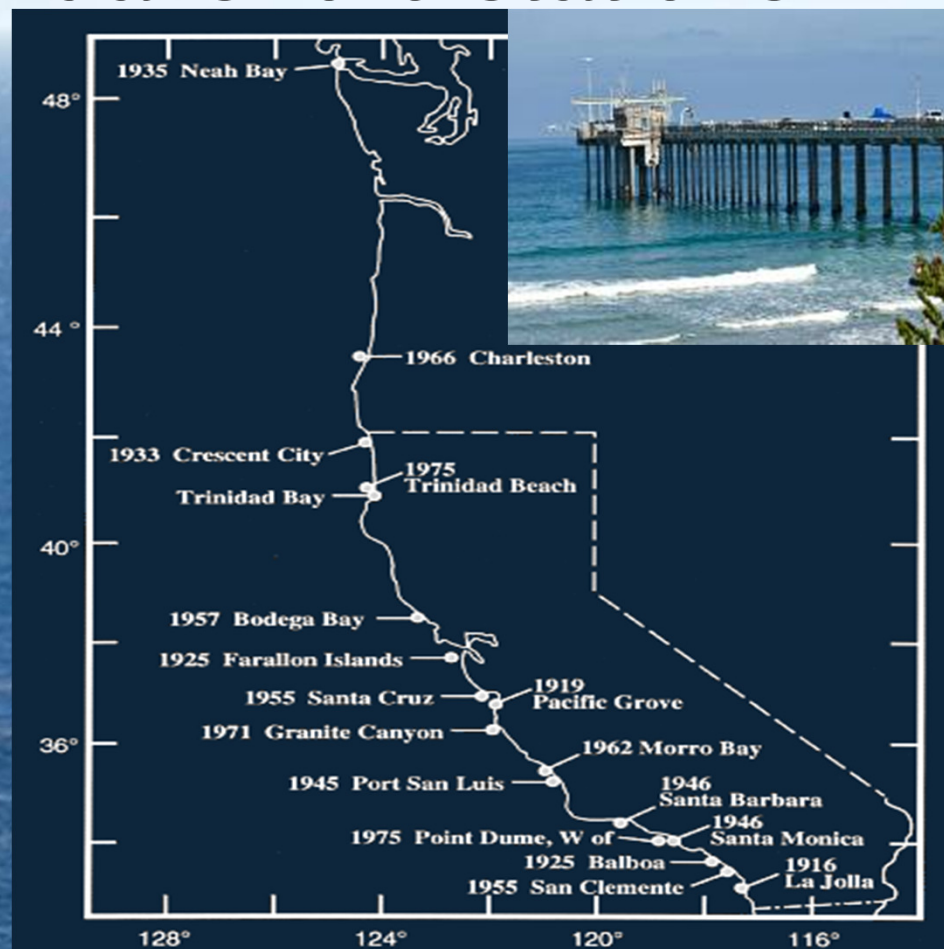


Data are from the Jan-Feb 2012 timeframe

Nearshore measurements from automated and manual shore stations

Data collected include:

- Temperature & salinity
- Chlorophyll fluorescence & turbidity or transmissivity
- Dissolved oxygen, pH, & water level
- Meteorological variables
- Phytoplankton & algal toxins to detect Harmful Algal Blooms



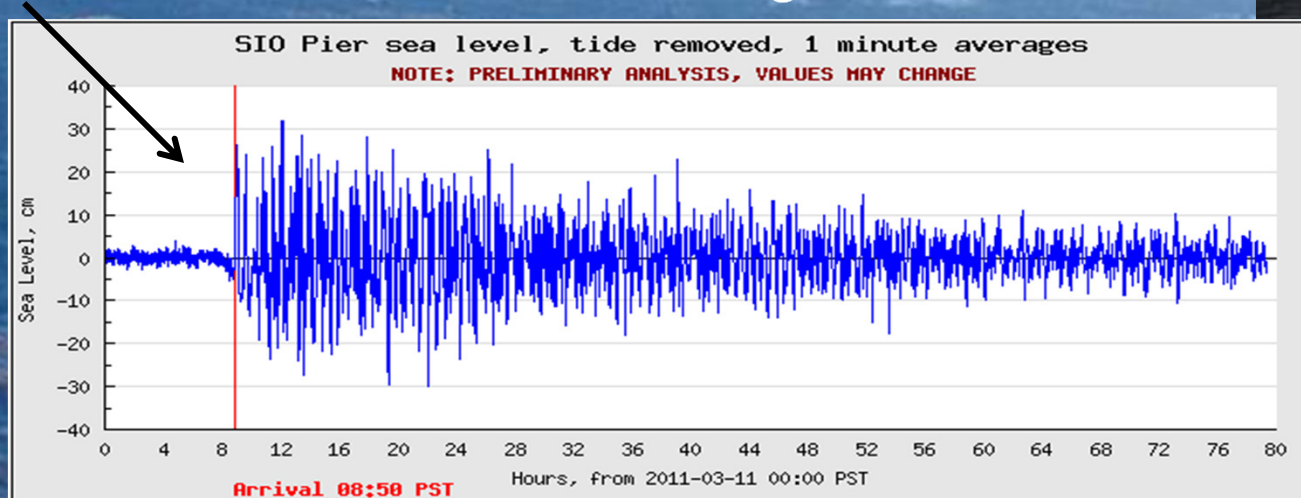
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More CeNCOOS & SCCOOS Nearshore Measurements

Water density used to calculate vessel loads →

Short-term event detection; e.g. tsunamis



http://www.sccoos.org/projects/2011_tsunami/

Long-term climate records

Sea Level collected since 1855 Sea Surface Temperature collected since 1880
Ocean pH and pCO₂ trends since 1993 Wave Height Trends since 1950
Coastal Upwelling trends since 1960 Salinity since 1916

CeNCOOS Shore Station

http://www.cencoos.org/sections/conditions/shore_stations.shtml

Home About Us News & Events Current Conditions Data Products Download Data Classroom Models

CURRENT CONDITIONS

Weather

Surface Currents

Waves

Ocean Buoys

Ocean Shore Stations

Tides

Water Quality

Satellites

Algal Blooms

Web Cams



Search Our Site



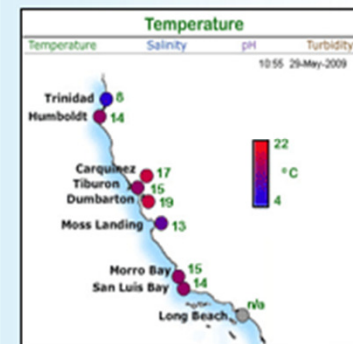
Real-time Ocean Shore Stations

View and download real-time data collected at shore stations with the [CeNCOOS Data Portal](#) or through the individual pages listed below

- [Trinidad](#) (Back Online!)
- [Humboldt Bay](#)
- [Tiburon](#)
- [Carquinez](#)
- [Moss Landing](#) (Seawater Intake Station)
- [Moss Landing Harbor](#) (Removed Oct 2010)
- [Monterey Wharf](#)
- [Morro Bay](#)
- [San Luis Bay](#)
- [Bodega](#) (Horseshoe Cove)
- [Fort Point](#) (near Golden Gate Br.)
- [Santa Cruz Wharf](#)

Click here on the Tiburon shore station

CSU COAST REAL-TIME SHORE STATION MAP



CeNCOOS contributes funding to the operations of the stations listed above, run in coordination with our partner institutions. The stations are usually attached to piers or docks that extend no more than 100 meters from shorelines. These stations typically monitor water temperature, salinity, dissolved oxygen, pH, chlorophyll and turbidity.

Other Stations

- [NOAA CO-OPS Program - San Francisco PORTS program](#) (weather, water temperature, water currents)
- [NOAA National Estuarine Research Reserve Program](#) (weather, water temperature, salinity, dissolved O2)
- [Scripps Shore Station Program](#) (datasets ranging from years to decades)
 - [Active Stations](#) (including Big Sur, Pacific Grove, Farallon Islands, Trinidad)
 - [Historic Stations](#)

CeNCOOS Shore Station Tiburon

<http://sfbeams.sfsu.edu/>

SAN FRANCISCO BAY ENVIRONMENTAL ASSESSMENT AND MONITORING STATION

SAN FRANCISCO STATE UNIVERSITY ROMBERG TIBURON CENTER

About SFBEAMS

Download Data

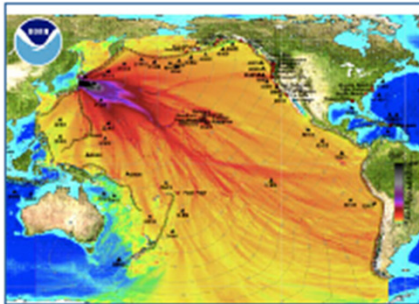
View Recent Data

System Specifications

Contact Us

Tsunami Felt in San Francisco Bay

Sensors in San Francisco Bay [document the rapid variations in water level](#) at various locations in the Bay.



Up-To-Date Environmental Measurements of San Francisco Bay

[Web Camera](#) | [Data Use Policies](#) | [Location Close Up](#) | [Location on SF Bay](#) |

Current Conditions


WEATHER	RTC PIER	WATER	RTC PIER	CARQUINEZ
Local Date	Tuesday, September 04, 2012	Local Date	Friday, August 31, 2012	Tuesday, September 04, 2012
Local Time	1:00:00 PM	Local Time	7:43:00 AM	1:06:00 PM
UTC Date	04 Sep 2012	UTC Date	31 Aug 2012	04 Sep 2012
UTC Time	20:00 :00 GMT	UTC Time	14:43 :00 GMT	20:06 :00 GMT
Air Temp	15° C (59° F)	Depth	1.2 m	2.7 m
Rel. Humidity	79 %	Water Temp	18° C (64° F)	20° C (67° F)
Atm. Pressure	1016 mb	Salinity	29 PSS	19 PSS
Wind	NW at 13mph	Density	1021 kg m ⁻³ 1020 oz ft ⁻³	1012 kg m ⁻³ 1011 oz ft ⁻³
Rain	0 mm	Chlorophyll	2.5 mg m ⁻³	n/a
PAR (Sunlight)	1473 $\mu\text{mol s}^{-1}\text{m}^{-2}$	Turbidity	23 NTU	12 NTU
		pH	7.91	8.46

Located north of the Tiburon Peninsula at 37° 53' 20" N • 122° 26' 48" W

SCCOOS

Automated Shore Station Page

<http://www.sccoos.org/data/autoshoarestations/>



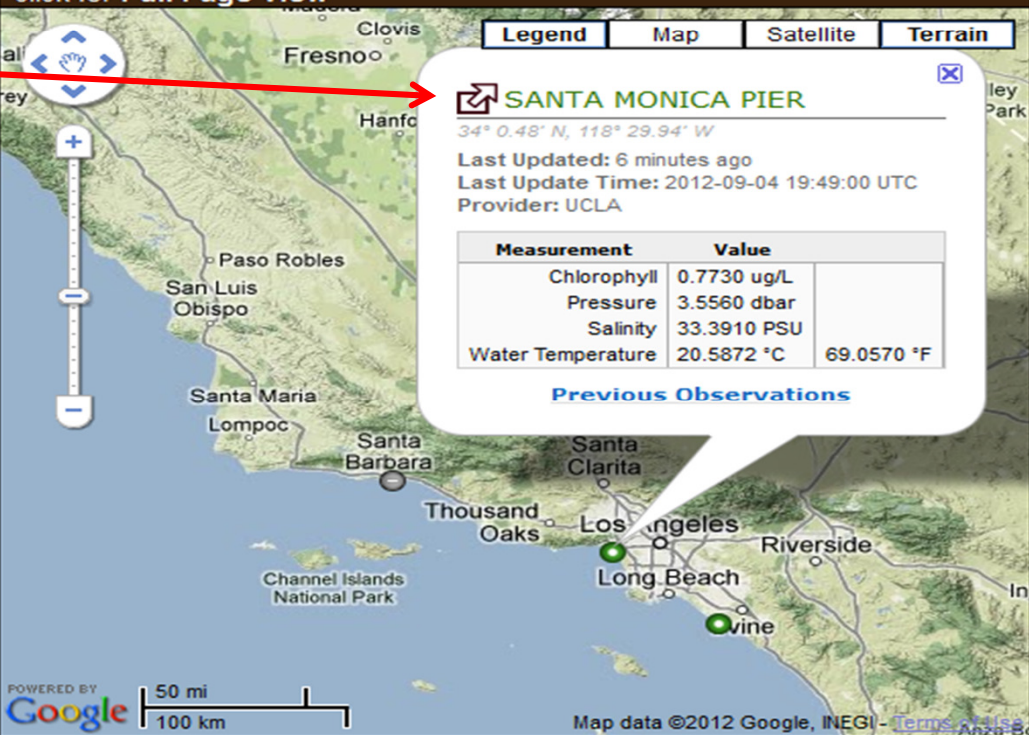
Click for map of all SCCOOS observations

SCCOOS AUTOMATED SHORE STATIONS

[← back to Data Products](#)

Automated shore stations consist of a suite of sensors that are attached to piers at several locations along the California coast. These automated sensors measure temperature, salinity, chlorophyll, turbidity and water level at frequent intervals in the nearshore coastal ocean. This data can provide local and regional information on mixing and upwelling, land run-off, and algal blooms. Metadata for the stations is available [here](#).

click for Full Page View



LEGEND Map Satellite Terrain

SANTA MONICA PIER

34° 0.48' N, 118° 29.94' W

Last Updated: 6 minutes ago
Last Update Time: 2012-09-04 19:49:00 UTC
Provider: UCLA

Measurement	Value
Chlorophyll	0.7730 ug/L
Pressure	3.5560 dbar
Salinity	33.3910 PSU
Water Temperature	20.5872 °C 69.0570 °F

[Previous Observations](#)

POWERED BY Google 50 mi 100 km Map data ©2012 Google, INEGI Terms of Use

create link for bookmark

Available Products

- [Automated Shore Stations](#)
- [Overview](#)
- [Stearns Wharf](#)
- [Santa Monica Pier](#)
- [Newport Pier](#)
- [Scripps Pier](#)

Available Services

- [Bathymetry](#)
- [CA ASBS System](#)
- [Gliders](#)
- [Harbors](#)
- [Harmful Algae & Red Tides](#)
- [Manual Shore Stations](#)
- [Meteorological Observations](#)
- [Moorings](#)
- [Plume Tracking](#)
- [ROMS Model Output](#)
- [Satellite Imagery](#)
- [Ship Tracking \(AIS\)](#)
- [Ship Casts](#)
- [Surface Current Mapping](#)
- [Wave Conditions \(CDIP\)](#)
- [Winds & Rainfall Forecasts](#)

LEGEND

- Operational
- More than 3 hours old
- More than 1 day old
- More than 1 week old
- Status unknown

SITES

Stearns Wharf
> **Santa Monica Pier** <
Newport Pier
Scripps Pier

SCCOOS Manual Shore Station Page

<http://www.sccoos.org/data/manualshorestations/>

ABOUT


DATA, PRODUCTS and MODELING

PROJECTS

CLASSROOM

USERS

HOME



Click for map of all SCCOOS observations

Available Products

[Automated Shore Stations](#)

[Bathymetry](#)

[CA ASBS System](#)

[Gliders](#)

[Harbors](#)

[Harmful Algae & Red Tides](#)

[Manual Shore Stations](#)

[Overview](#)

[Neah Bay](#)

[Charleston / Coos Bay](#)

[Crescent City](#)

[Trinidad Beach](#)

[Trinidad Bay](#)

[Bodega Bay](#)

[SE Farallon Island](#)

[Santa Cruz](#)

[Pacific Grove](#)

[Granite Canyon](#)

[Morro Bay](#)

[Port San Luis / Avila](#)

[Santa Barbara](#)

[Pt. Dume](#)

[Santa Monica](#)

[Newport Beach](#)

[Santa Catalina Island](#)

[San Clemente](#)

[SIO Pier](#)

Manual Shore Stations

UTC Time: 2012-09-04 20:06:26
Local Time: 2012-09-04 13:06:26

The Manual Shore Stations Program collects, checks and publishes temperature and salinity data observed at shoreline stations along the United States West Coast from La Jolla, California to the Strait of Juan de Fuca, Washington. The data consist of daily temperature and salinity values when available. This program ranks as one of the worlds longest ocean time series and the longest on the Pacific Rim. From this time series we can accurately pin down the nature of ocean seasonality for the entire coast of California, and have begun to understand the anomalies caused by recurring equatorial El Nino Conditions. There have been large cold anomalies too, but, as yet, we do not understand their cause. In addition to these episodic anomalies, there has been a long-term trend for a warmer California Current, beginning around 1977. These warm and cold anomalies and the long-term warming trend have significant biological effects on plankton production, fish catch, and seabirds. They also are associated with changes in sea level, wave heights and beach erosion. We are only beginning to learn the details of the linkages between all these processes. This growing databank provides us with one of the first opportunities to separate natural from man-cause changes in our coastal zone. This work is a collaborative program sponsored by the California Department of Boating and Waterways.

All Stations

Bodega Bay

Charleston / Coos Bay

Crescent City

Pacific Grove

Granite Canyon

Morro Bay

Neah Bay

Newport Beach

Port San Luis / Avila

Pt. Dume

San Clemente

Santa Barbara

Santa Catalina Island

Santa Cruz

Santa Monica

SE Farallon Island

SIO Pier

Trinidad Beach

Trinidad Bay

Please note:
manual
shore station
data are
updated
periodically
not
continuously
As a result,
the
SCCOOS
data
repository
may lag
behind the
actual data
collection.

Manual Shore Stations

UTC Time: 2012-09-04 20:10:47
Local Time: 2012-09-04 13:10:47

Bodega Bay Shore Station

In the latter part of 1989, the Marine Biological Laboratory located at Horseshoe Cove switched from manual sampling to an automated meteorological and oceanographic monitoring system. Installed at the same site, this system records temperature and salinity at the aquarium's water system intake located in a deep rocky channel on the northern headland of the cove. The manual and automated data sets overlapped in 1990 with good agreement, so the manual collections of samples subsequently ceased in 1991. The temperature and salinity values presented are, for the most part, the 0815 data point, and since the water is deep and the headland steep and rocky, these values are representative of the coastal water.

Latitude: 38° 18.60' N

Longitude: 123° 4.32' W

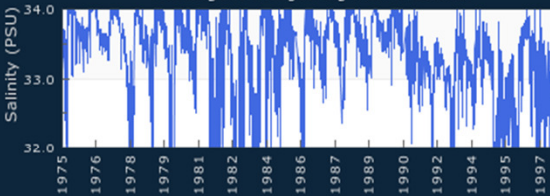
Operational since December 1956

Measurements Taken

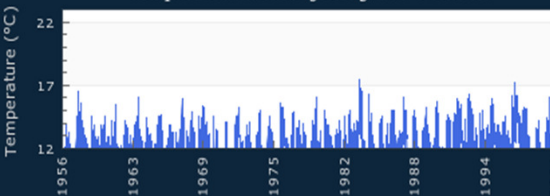
Salinity

Temperature

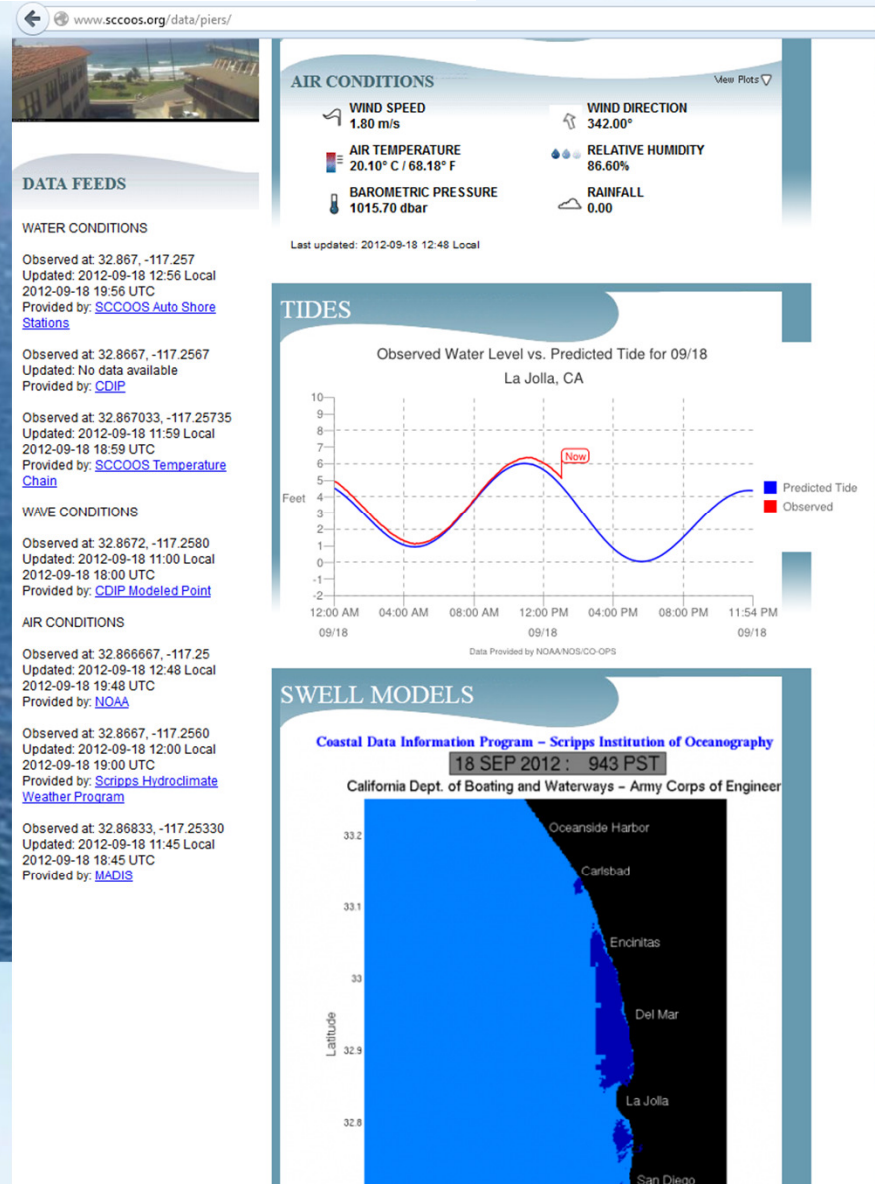
Salinity at Bodega Bay Shore Station



Temperature at Bodega Bay Shore Station



<http://www.sccoos.org/data/piers>



SCCOOS and CeNCOOS Support HAB detection which contributes to Cal HABMAP

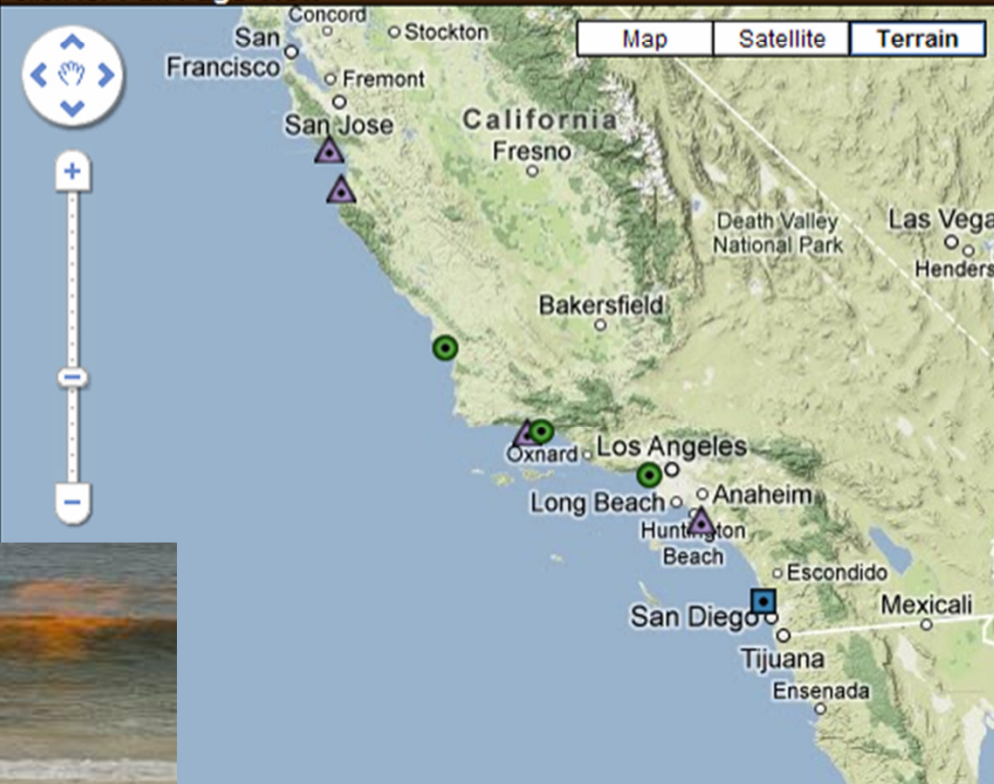
<http://www.sccoos.org/data/habs/index.php>

Harmful Algae & Red Tide Regional Map

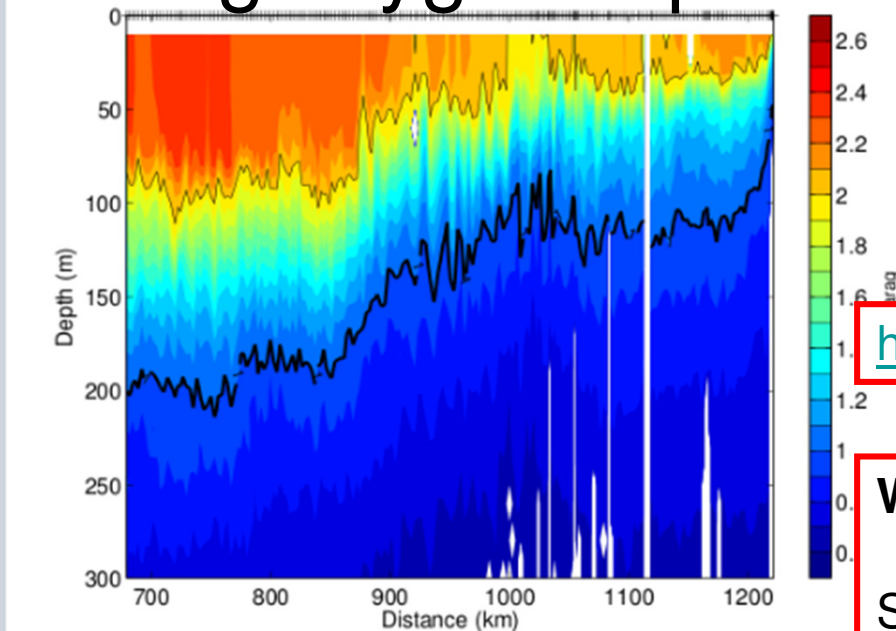
[Map View](#) [About](#) [HAB News](#) [What Are HABs?](#) [HAB Species](#)

Follow the links above to learn more about harmful algal blooms (HABs), HAB species, and collection procedures. Click a station on the map below to view data on potential harmful algal species and water conditions at regional stations.

click for **Full Page View**



SCCOOS support ocean acidification efforts by collecting oxygen & pH levels in coastal waters

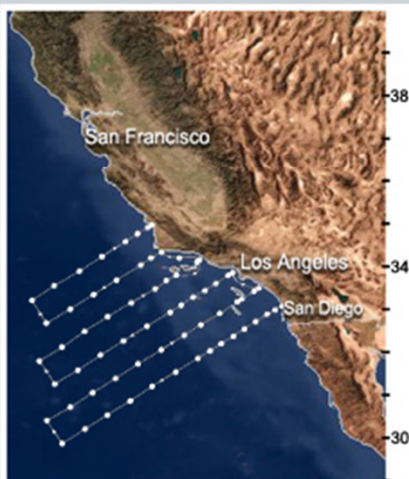


<http://www.sccoos.org/projects/2012OA/>

What is SCCOOS doing?

SCCOOS plans to add ocean acidification monitoring to its ongoing observations of the coastal ocean. Sensors that monitor pH, $p\text{CO}_2$, and dissolved oxygen can be added to pier stations and gliders. These observations will allow for continuous measurements of acidification in the Southern California Bight and will allow for improvements to be made to the models that forecast climate change.

CALCOFI



SCCOOS supports nine nearshore stations of the [California Cooperative Oceanic Fisheries Investigations \(CalCOFI\)](http://calcofi.org). The CalCOFI group collects samples to characterize the inorganic carbon system at selected locations along its research cruise tracks. Total inorganic carbon and alkalinity are measured which allow for the calculation of pH and $p\text{CO}_2$. <http://calcofi.org/field-program/rosette-sampling/454-under-co2>

SWRCB Pilot Program on Ocean Acidification

- Durafet pH sensors have been installed at 3 CeNCOOS and 2 SCCOOS shore stations and 1 LOBO estuarine mooring
- Water samples are being collected weekly for analyses at Scripps
- Help establish pH variability in coastal ocean and determine best methods to measure it



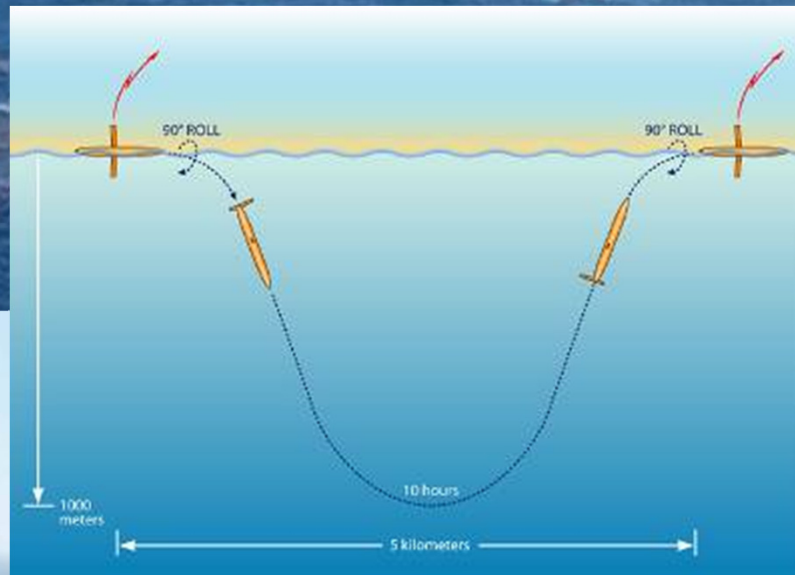
Sept. 24, 2012



Profiling Gliders



- Gliders are controlled remotely via satellite, and autonomously collect data in the water column along a transect
- Measure temperature, salinity, chlorophyll fluorescence, current velocity—and soon, dissolved oxygen (and pH and aragonite saturation via proxy relationships for **acidification monitoring**)
- Data is assimilated into numerical models, and used in studies of climate change and its impacts on California's coast



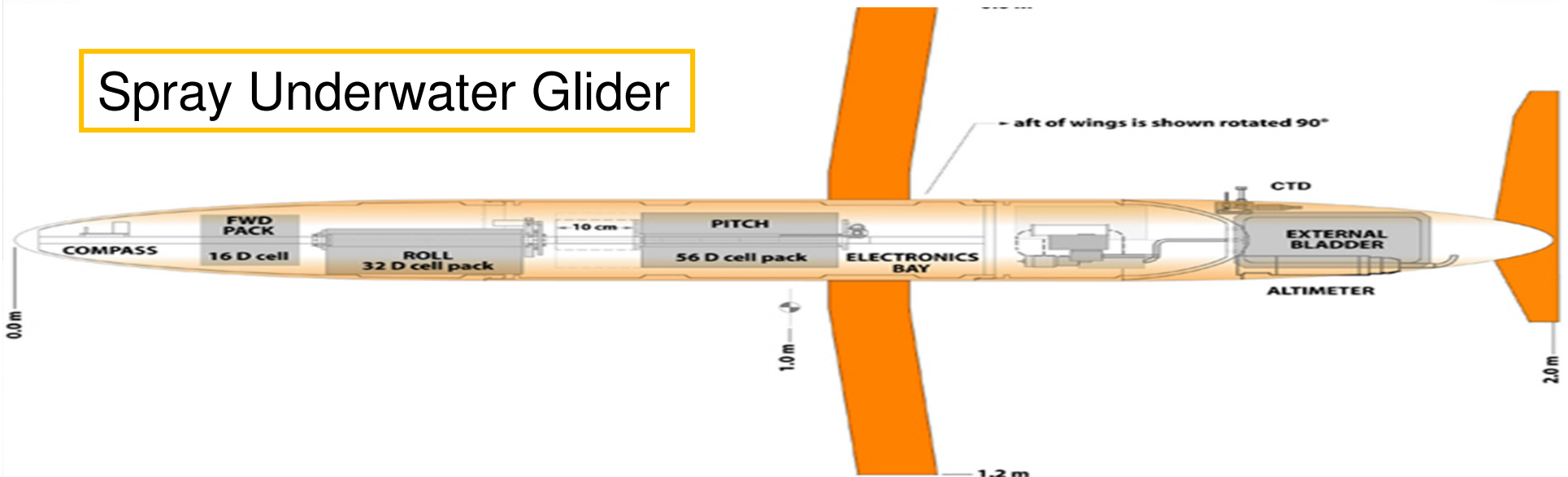
How Gliders Work...

- Weight: 50 kg, Length: 2 m, wingspan: 1 m
- Profiles by changing buoyancy
- Steers by changing center of mass
- 2-way Iridium communication
- GPS navigation
- Pressure, temperature, salinity, velocity, chlorophyll, fluorescence, acoustic backscatter, nitrate, optical backscatter, ...



Glider operations on the US coast

Spray Underwater Glider

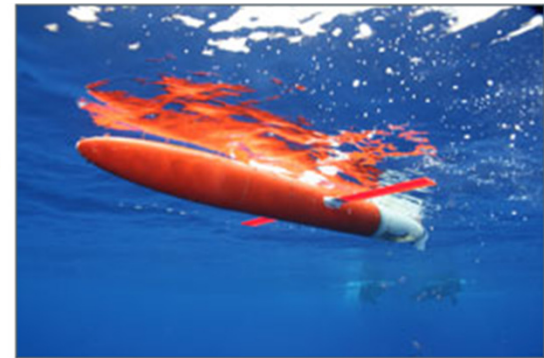


CeNCOOS Glider info

<http://www.cencoos.org/sections/data glider/>

Ocean Glider Data

Spray gliders are operated collaboratively by MBARI, Scripps Institute of Oceanography and CeNCOOS with funding from NOAA and the State of California. Real-time data from the current glider mission is available as well as access to data from prior missions. Typically the gliders sample water temperature, salinity, chlorophyll fluorescence and acoustic backscatter from the surface to 500 meters depth.



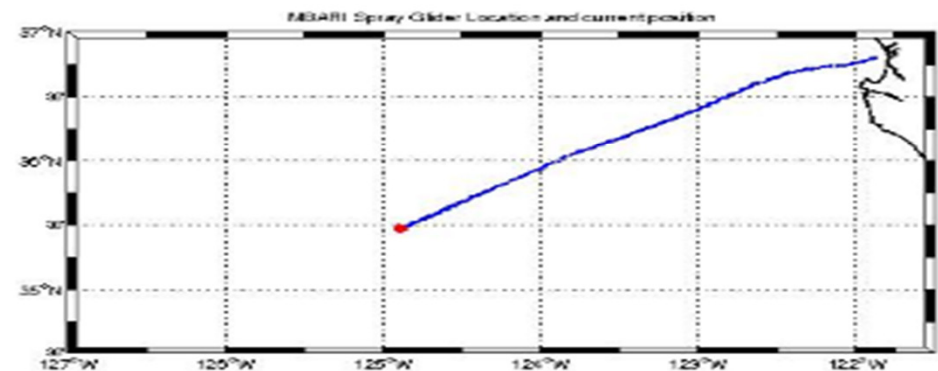
Current Glider Missions

Monterey Bay Offshore Glider (Transect 66/67)

Deployed from Apr 2012 to Present

- [Current Mission Data and Plots](#)
- [Archived Data Access](#)

Current Glider Position



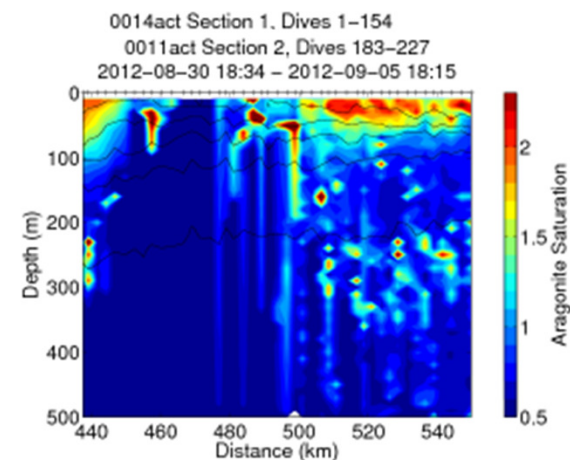
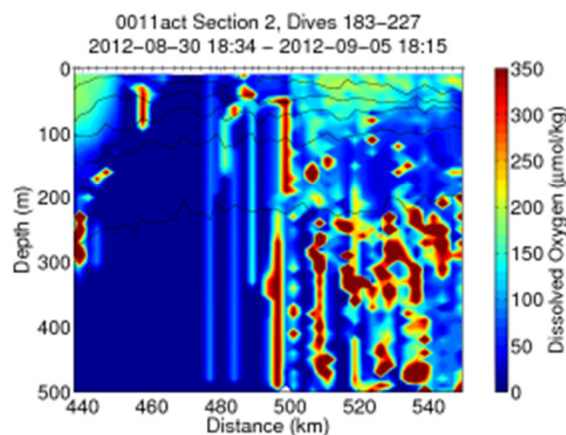
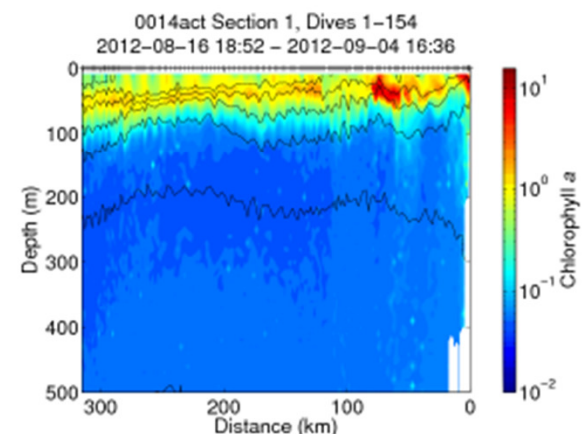
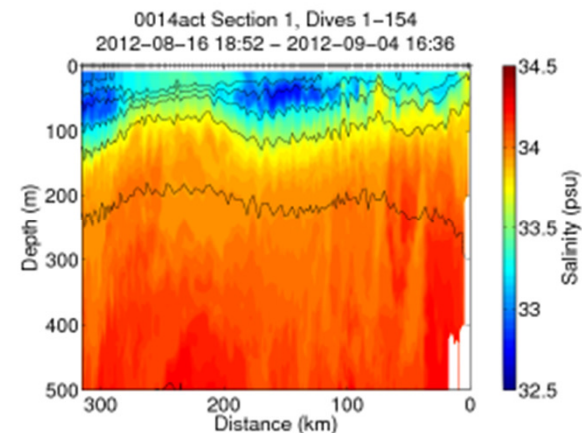
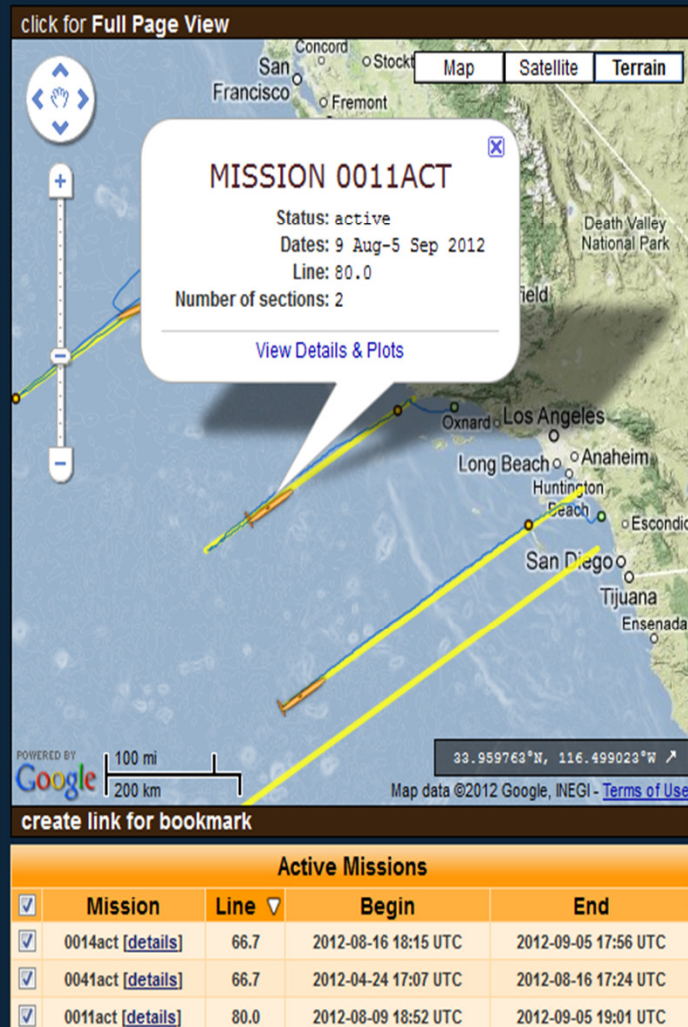
SCCOOS Glider info

<http://www.sccoos.org/data/spray/?r=0>

Spray Glider missions are shown on the map below. Click on a glider line to show missions on that line, choose which missions to display from the legend and map control, and view individual missions from the table below.

IOOS is developing a National Glider/Sub-Surface Plan. Attached is a preliminary [whitepaper](#).

There are currently
3 active gliders in
the SCB



Possible Future Capabilities

http://cencoos.org/sections/news/Pacific_glider_crossing.shtml

- Surface wave gliders

4 wave gliders were launched on Nov. 7, 2011 out of San Francisco. During their 33,000 nautical mile journey, they will travel across some of the world's most challenging environments.

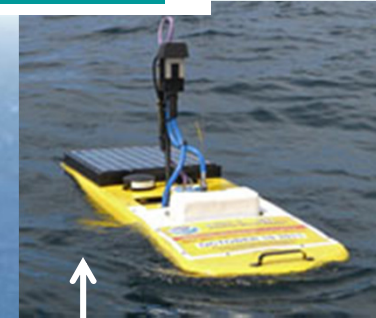


Photo from
above and
below

- Ambient noise and acoustic tag monitoring

Acoustic tags, small sound emitting devices, have been mounted on various pelagic fish. Receivers on moorings and wave gliders detect tagged fish that are within 400 - 800 m, and the information is relayed to shore via satellite. Other types of receivers detect ambient noise. Other types of animal tags measure oceanographic properties as well as animal's position.





BREAK!!



**Meet Back in This Room in
15 Minutes, Thank you!**



Coastal Data Information Program

Wave Buoys

Mission: Monitor and predict near shore waves and shoreline change.



- Based at SIO since 1975
- 35 Wave Stations
LIDAR & In-Situ Beach Surveys
- 17 People
- \$3.5M+ / year budget
- Funded by:
USACE
CDBW (SCCOOS
NOAA, CCC, ONR...)

Investigators:
Richard Seymour
Robert Guza
Bill O'Reilly



CDIP wave buoys in California

Storm and El Niño
enhanced sea levels during
an extreme tide

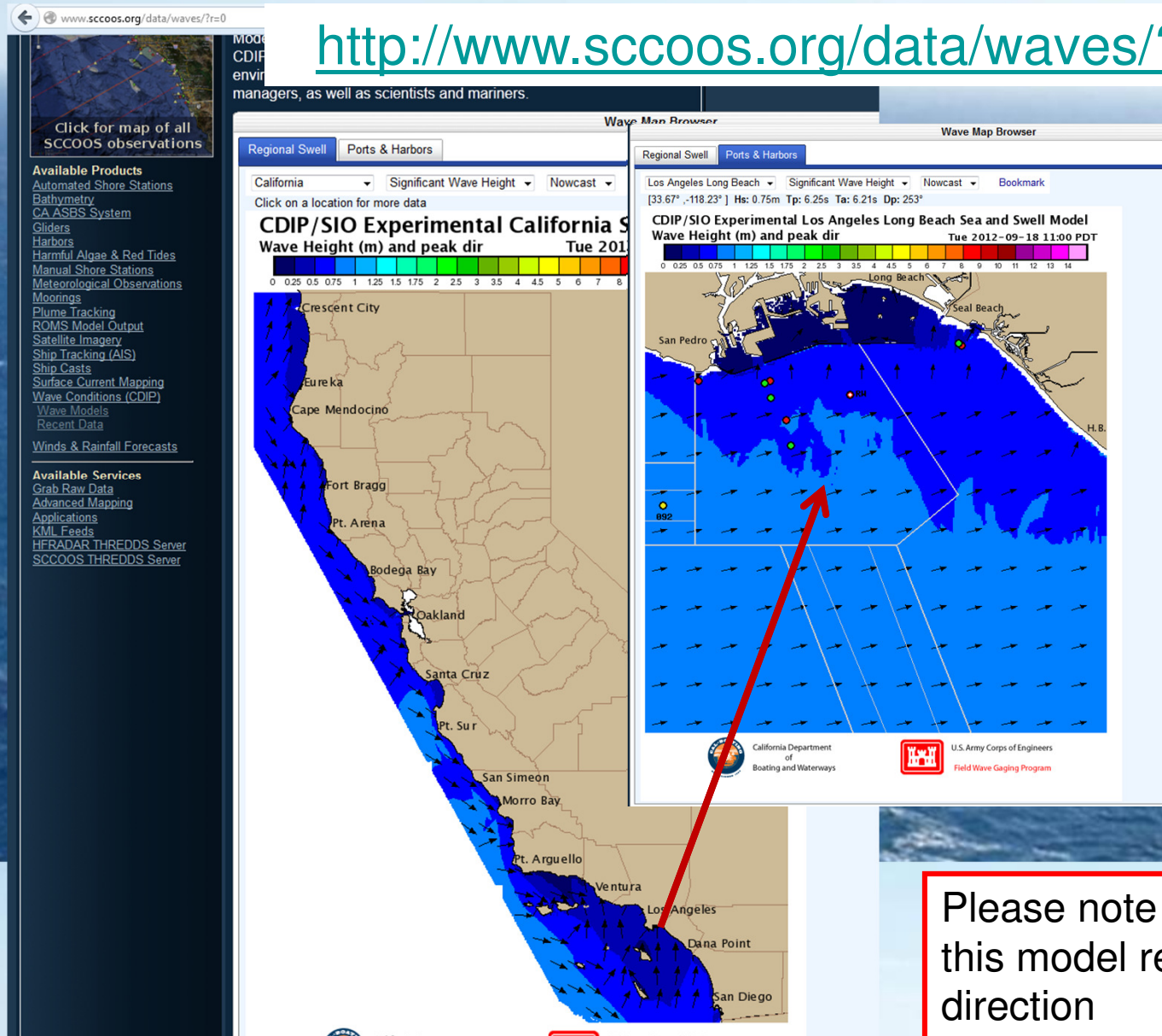


Ocean Beach Feb 1983

**Current CDIP
Measurements
Contribute To Baseline
& Sustaining Data**

SCCOOS Swell Model

<http://www.sccoos.org/data/waves/?r=0>



Models provided by The Coastal Data Information Program (CDIP). CDIP measures, analyzes, archives, and disseminates coastal environment data for use by coastal engineers, planners, and managers, as well as scientists and mariners.

Please note the arrows on this model represent swell direction

SCCOOS Meteorological Observations

<http://www.sccoos.org/data/mets/>

Meteorological Observations

- Overview
- Morro Bay
- Santa Barbara Channel
- Ventura County
- Los Angeles
- South Channel Islands
- Orange County
- North San Diego
- San Diego

Meteorological Observations

- Overview
- Morro Bay
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- South Channel Islands
- Orange County
- North San Diego
- San Diego

Meteorological Stations and Observations

Stations Reporting

Map Satellite

Click location on map to view station info and recent observations

Create Link for Bookmarks

Now Showing:

Channel: Air Temperature Units: °F

Filters:

Providers: MARITIME SCCOOS QCSD MesoWest RAWS APRSWXNET OTHER-MTR WXforYou NOS-PORTS

Regions: Morro Bay Santa Barbara Channel Ventura County South Channel Islands Los Angeles County Orange County North San Diego San Diego All Regions

Distance: < 15 km

This box allows you to chose which stations to display based upon their distance from the coastline.

For access to raw data, visit the [MADIS query page](#).

A description of the individual providers can be found [here](#).

Meteorological Observations

Click for Full Page View

Map Satellite Hybrid Inactive

Click location on map to view station info and recent observations

Create Link for Bookmarks

Now Showing:

Channel: Sea Surface Temp. Units: °F

Filters:

Providers: MARITIME SCCOOS QCSD MesoWest RAWS APRSWXNET OTHER-MTR WXforYou NOS-PORTS

Regions: Ventura County South Channel Islands Los Angeles County Orange County North San Diego San Diego All Regions

Distance: < 5 km

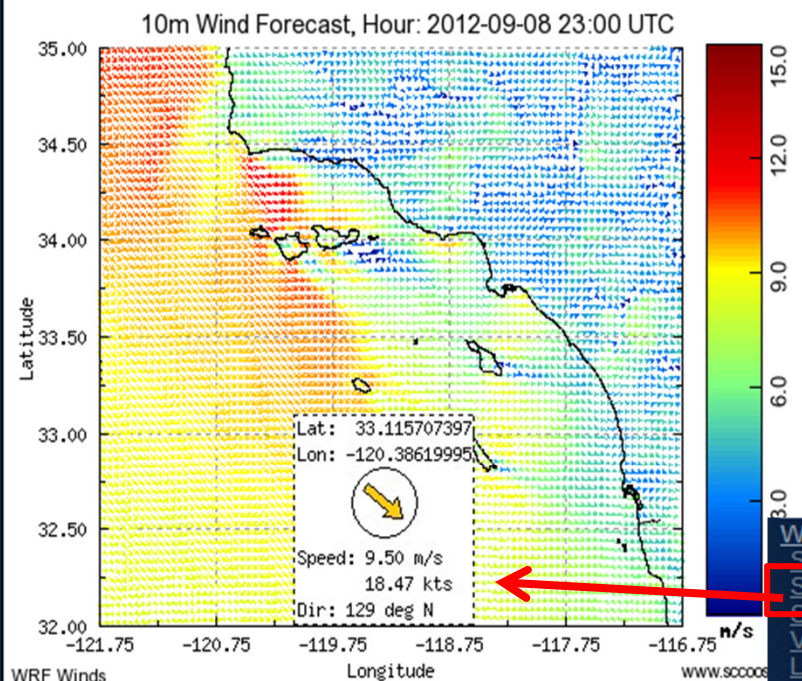
SCCOOS Weather Research & Forecasting 12.5 km Model

<http://www.sccoos.org/data/winds/>

WRF 12.5km Modelled 10m Wind Fields - UTC Time: 2012-09-06 16:27:58
Southern California Local Time: 2012-09-06 09:27:58

Hourly Forecasts
Time Sample: 2012-09-08 23:00:00 UTC

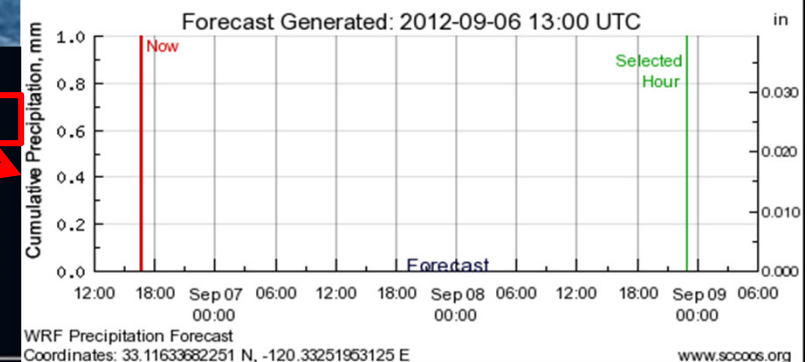
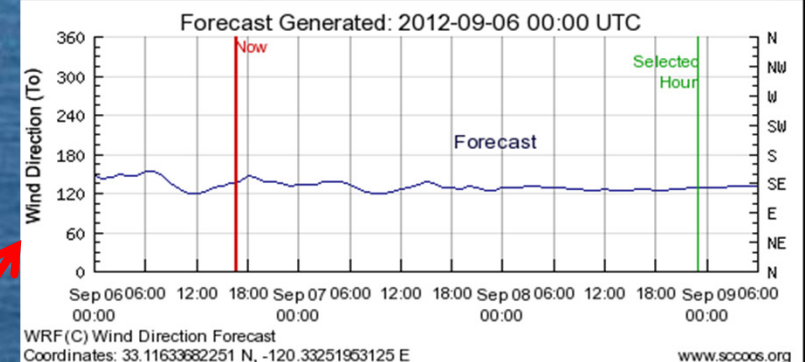
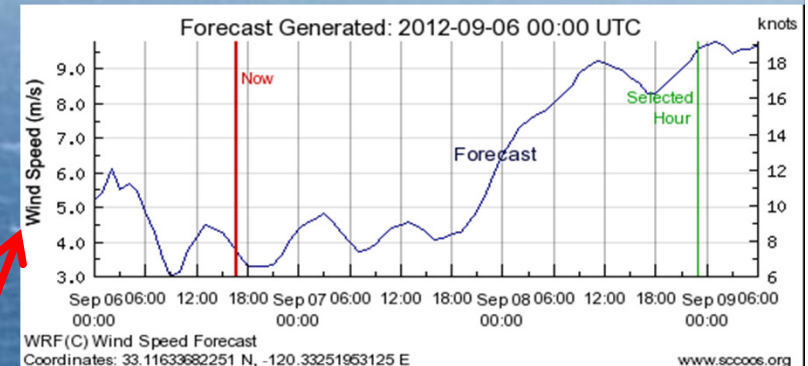
-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
59	60	61	62																					



Credits:

Weather Research & Forecasting Model (WRF) wind and precipitation forecasts are provided by UCLA Department of Atmospheric and Oceanic Sciences, Climate Sensitivity Research Lounge.

Winds & Rainfall Forecasts
Southern California Rainfall
Southern California Winds
Santa Barbara Channel
Ventura County
Los Angeles
Los Angeles to San Diego
South Channel Islands
Orange County
North San Diego
San Diego



SCCOOS Remote Sensing

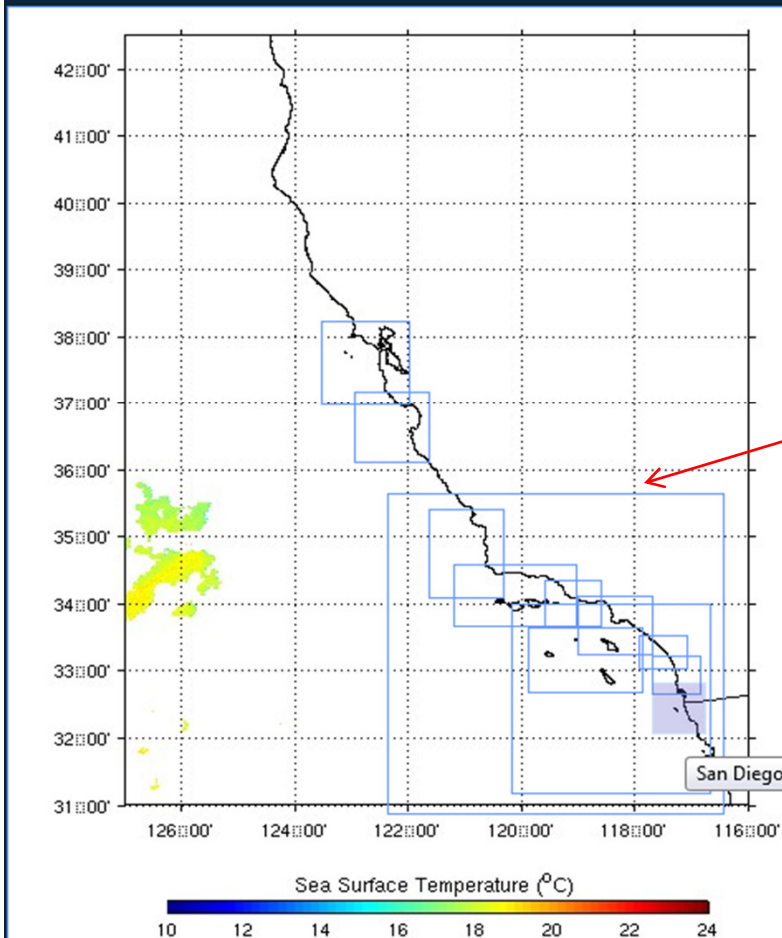
Sea Surface Temperature and Chlorophyll

http://www.sccoos.org/data/modis/modis_california.php

MODIS California Overview

Time of pass: Sep 05 2012 22:10:00 UTC

[Sep 05] [Sep 05] [Sep 05] [Sep 04] [Sep 04] [Sep 03] [Sep 03] [Sep 03]



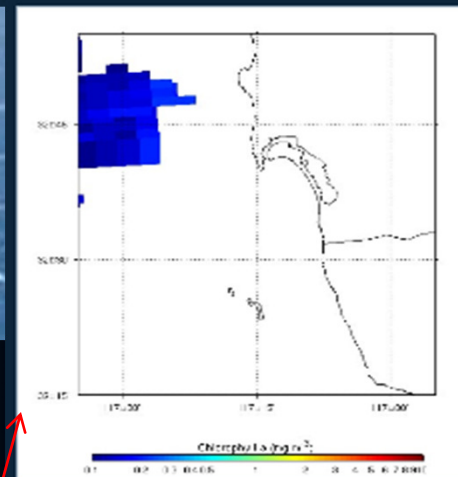
Click on a region to view its most recent Chlorophyll and TSM data.

MODIS » San Diego

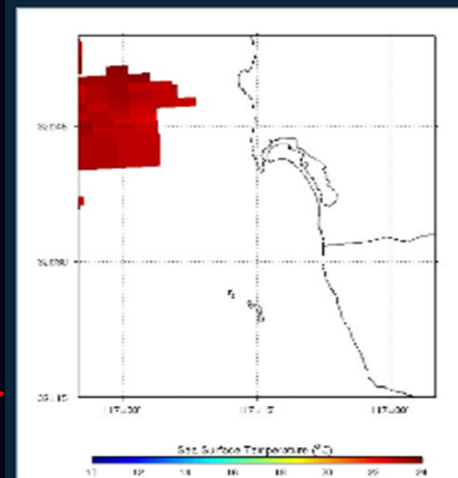
Time of pass: Sep 09 2012 21:45 UTC

UTC Time: 2012-09-10 19:35:12

Local Time: 2012-09-10 12:35:12



Chlorophyll



Satellite Imagery
JPL Satellite Ocean Data
Viewer (requires Google
Earth plugin)
MODIS SST / Color
Overview
California
San Francisco Bay
Monterey Bay
Southern California
Morro Bay
Santa Barbara Channel
Ventura County
Santa Monica Bay
Los Angeles
Los Angeles to San Diego
South Channel Islands
Orange County
North San Diego
San Diego

OI SST
GOES Hourly Satellite
Images

Recent Passes (UTC)

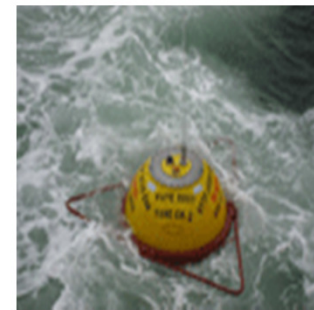
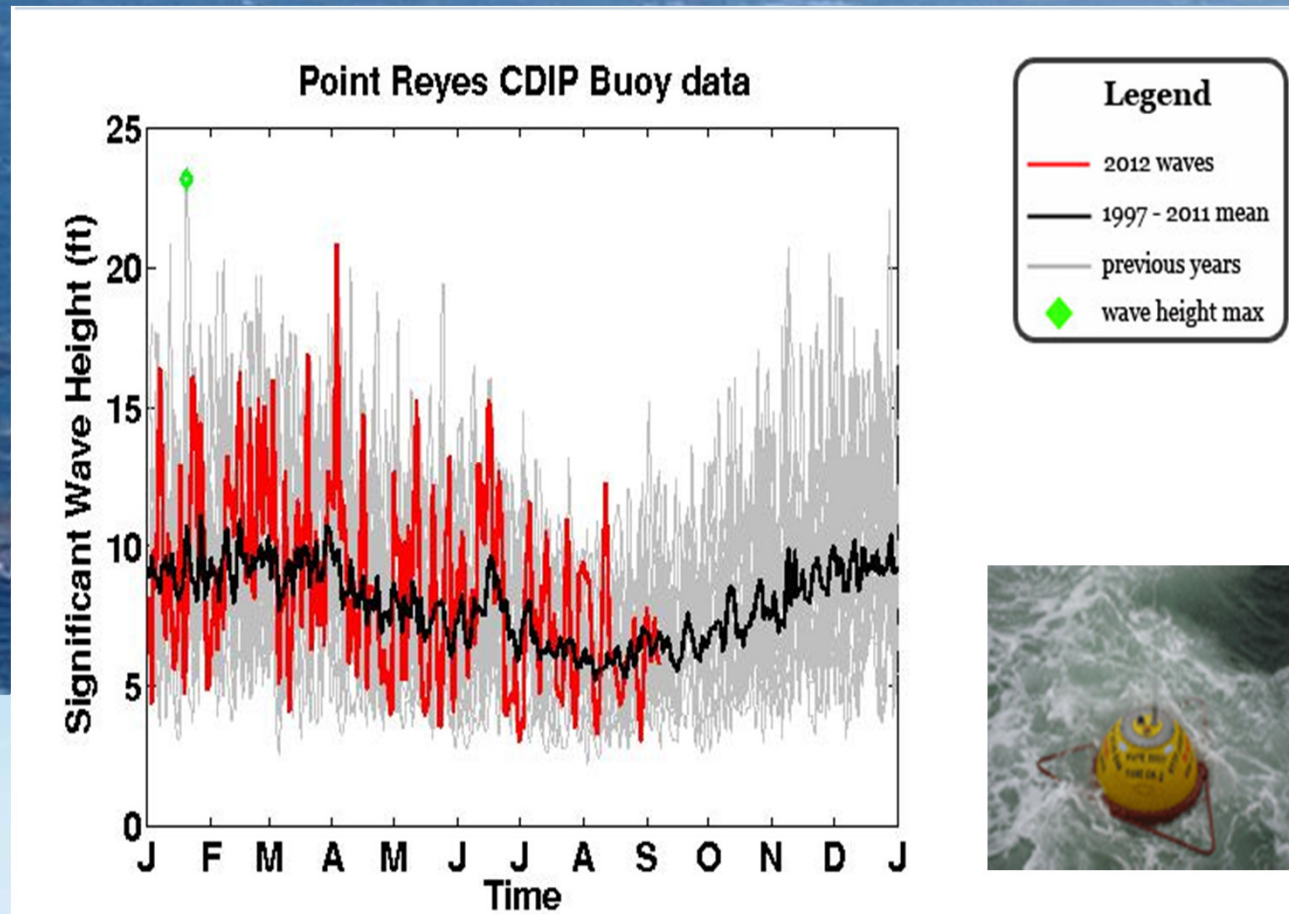
Sep 09 2012 21:45
Sep 06 2012 21:15
Sep 05 2012 20:30
Sep 04 2012 21:25
Sep 03 2012 20:45
Sep 02 2012 21:40
Sep 01 2012 20:55
Aug 31 2012 21:50



Wave Climatology: CDIP Buoy Pt. Reyes

Past/Present Wave Heights

http://www.cencoos.org/sections/products/wave_climatology.shtml

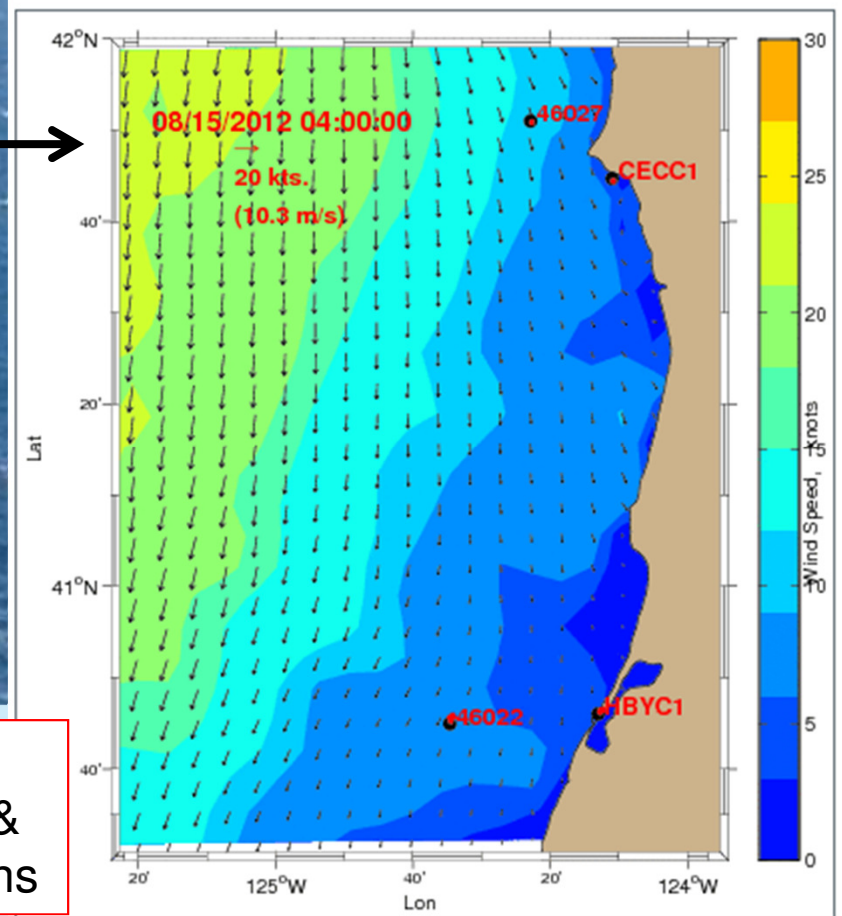
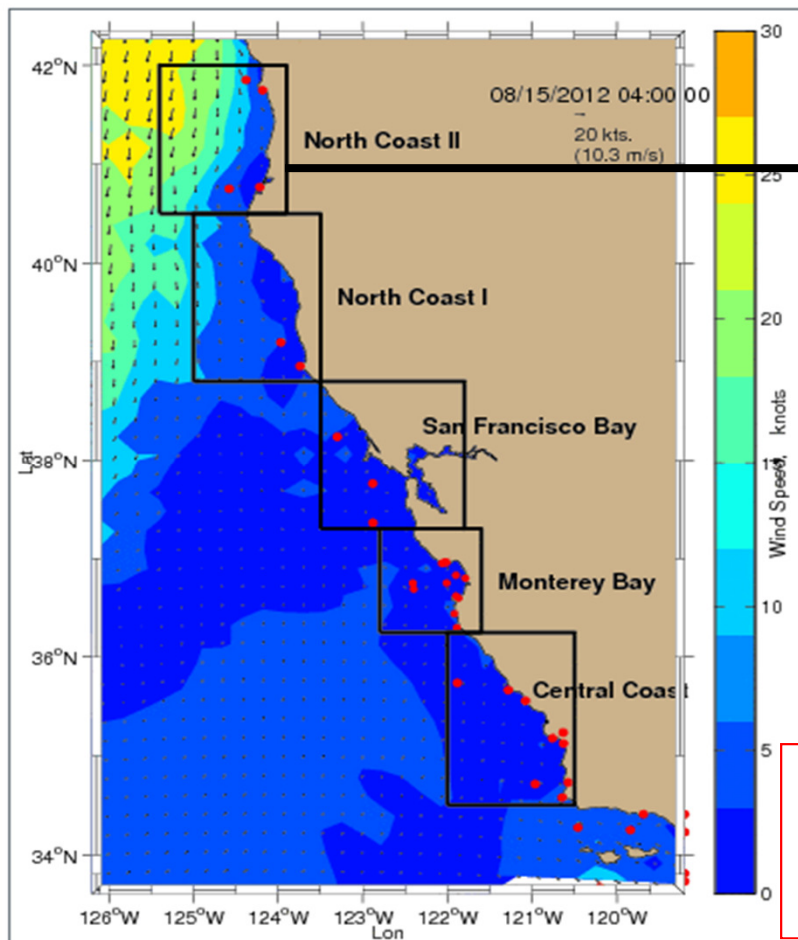


CeNCOOS Coastal Winds Model and Observations

http://www.cencoos.org/sections/products/winds_product_descrip.shtml

Wind for 08/15/2012 04:00 Pacific Daylight Saving Time

Wind for 08/15/2012 04:00 Pacific Daylight Saving Time



3 km
COAMPS &
observations

ANIMATE

STOP

PAUSE

RESUME

ANIMATE

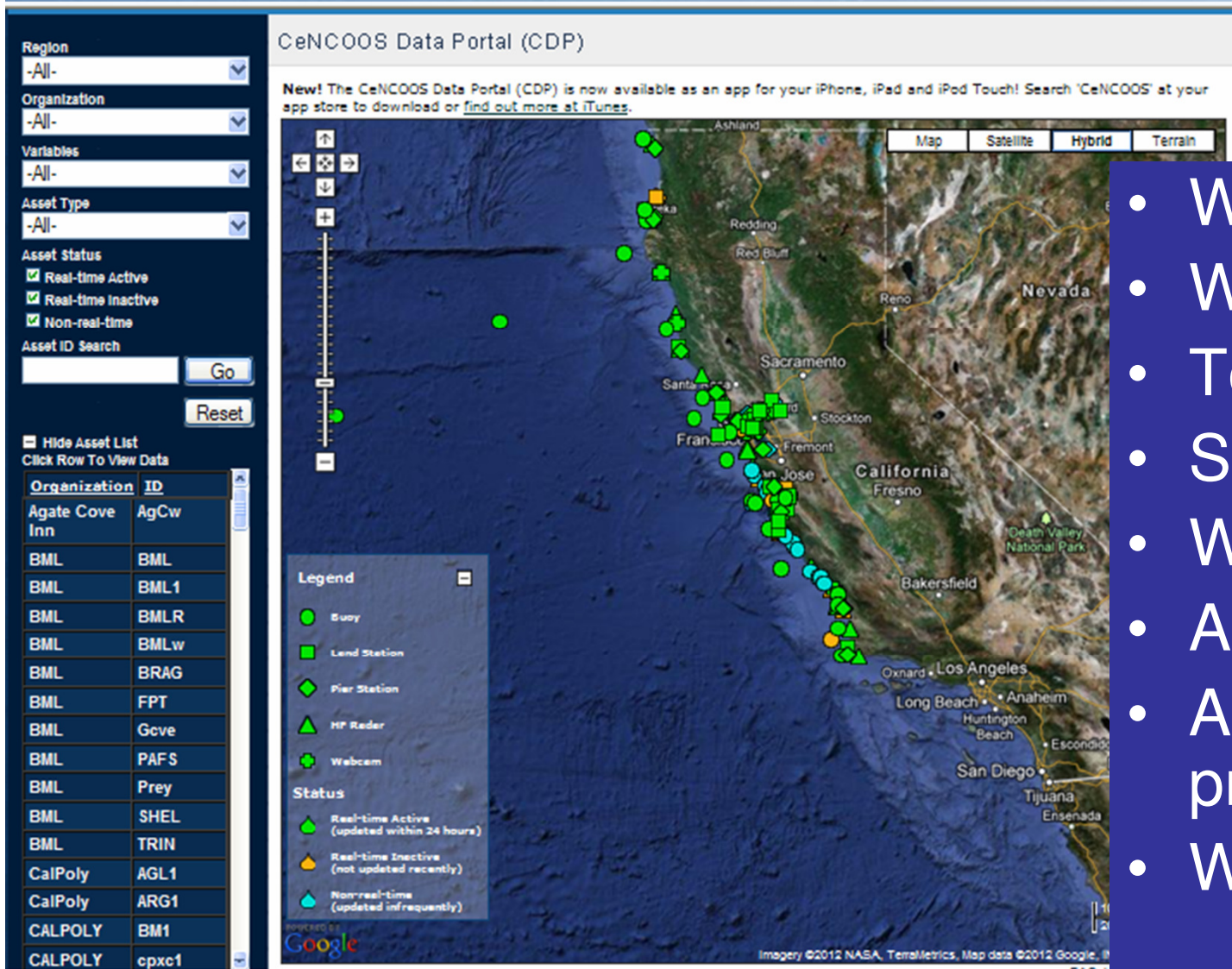
STOP

PAUSE

RESUME

CeNCOOS Data Portal

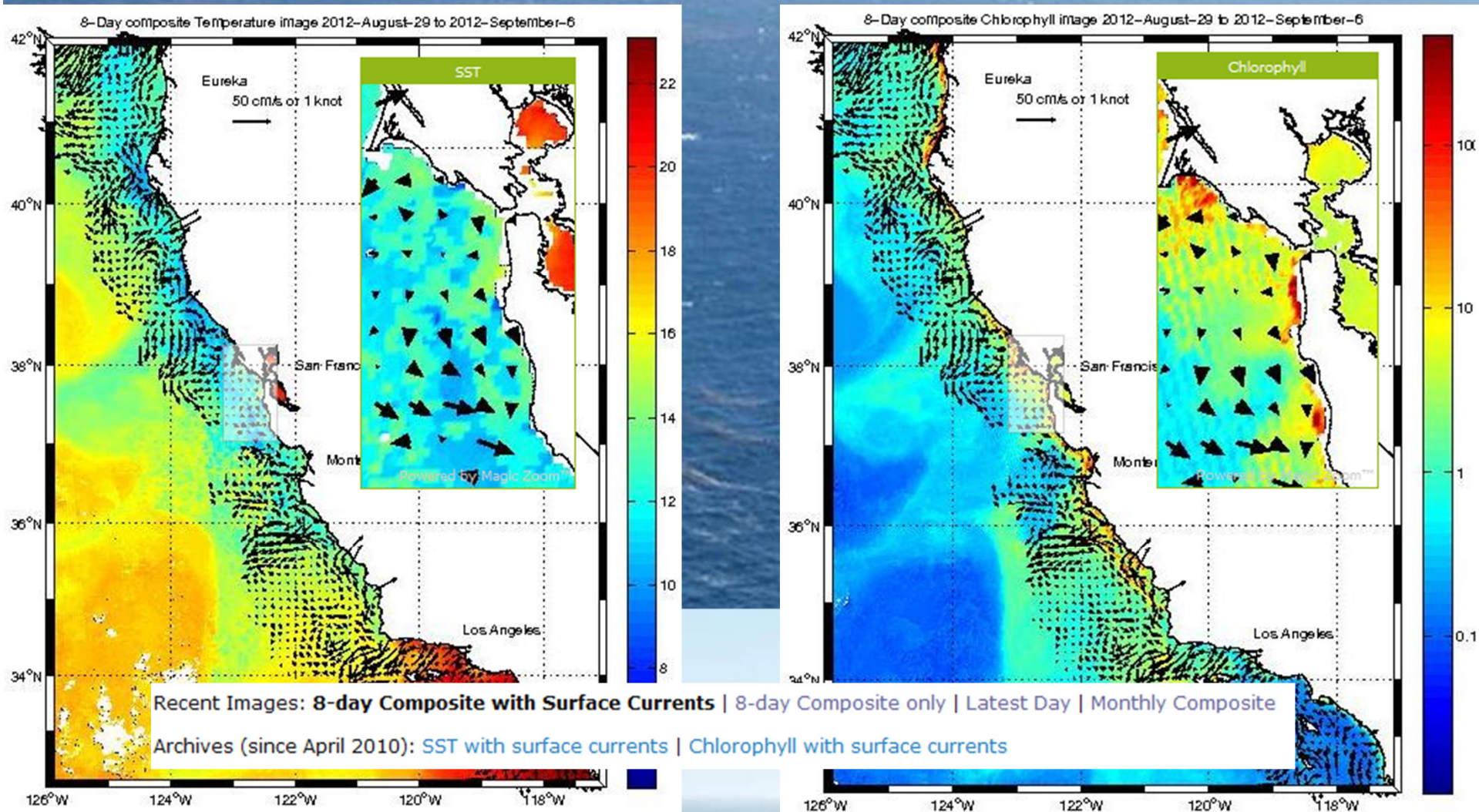
<http://204.115.180.244/CeNCOOS/DataPortal.html>



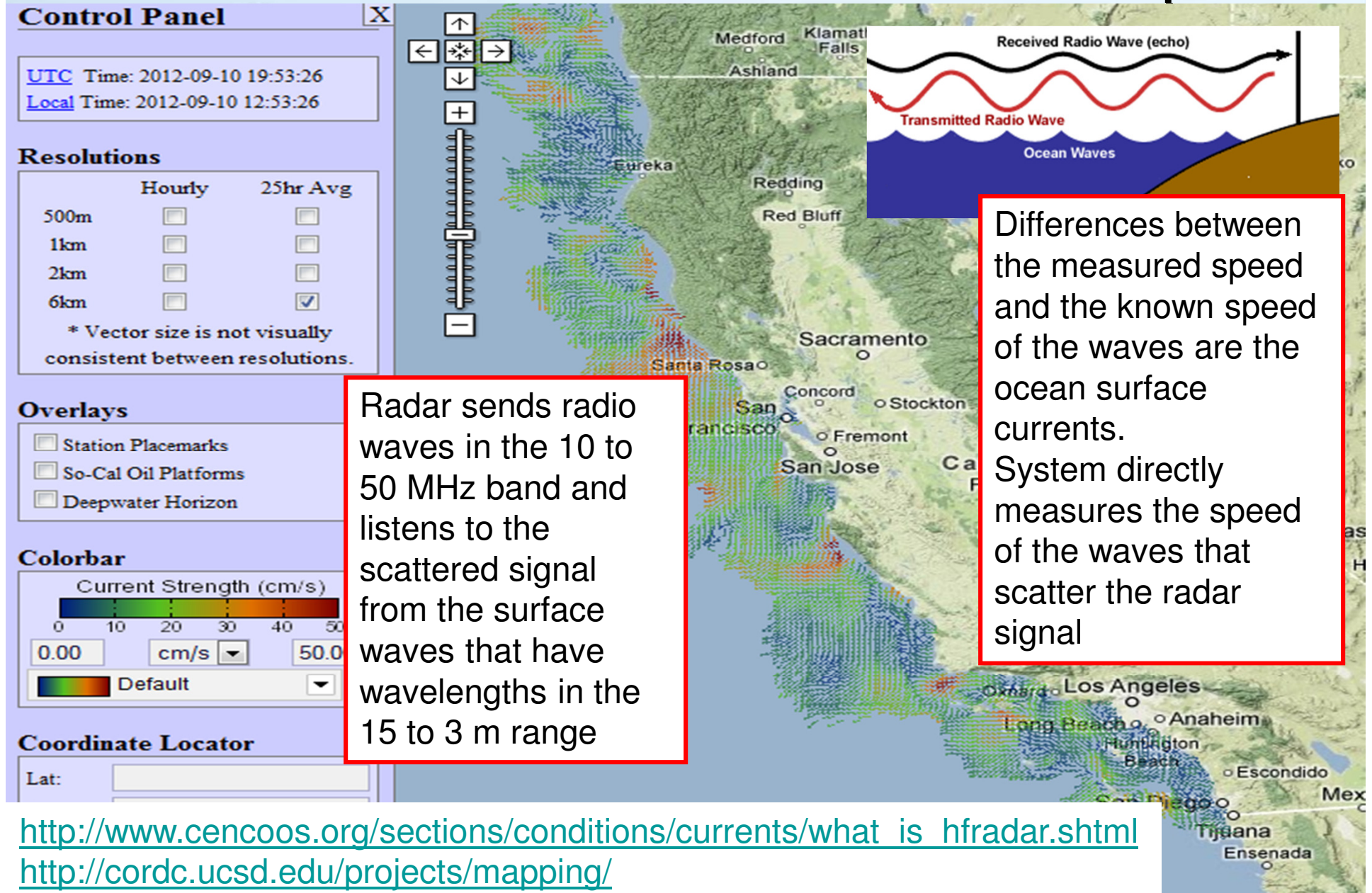
- Waves
- Water level
- Temperature
- Salinity
- Wind
- Air temperature
- Atmospheric pressure
- Web cams

CeNCOOS Remote Sensing Sea Surface Temperature (SST) & Chlorophyll

http://www.cencoos.org/sections/conditions/SST_Ch1.shtml



HF Radar Surface Current Maps



Real Time Processing of HF Radar-Derived Surface Current Mapping Data

- ✦ Retrieve radial current fields from each site each hour
- ✦ Form vector maps
- ✦ Fill spatial gaps
- ✦ Compute surface particle trajectories
- ✦ Estimate tomorrow's velocity fields based on recent mean current and tidal fluctuations
- ✦ Produce netCDF file for GNOME model with 48 hr observations and 24 hr forecast



Why is surface current mapping with high frequency radar (HFR) important?

Provides continuous, high resolution mapping of currents for:

- Tracking point source pollution or discharges
- Oil spill preparedness and response
- Search and Rescue
- Marine operations
- Connectivity analyses: e.g. MPAs, coastal discharges, larval retention areas
- Assimilation into numerical models
- Analysis of long-term trends

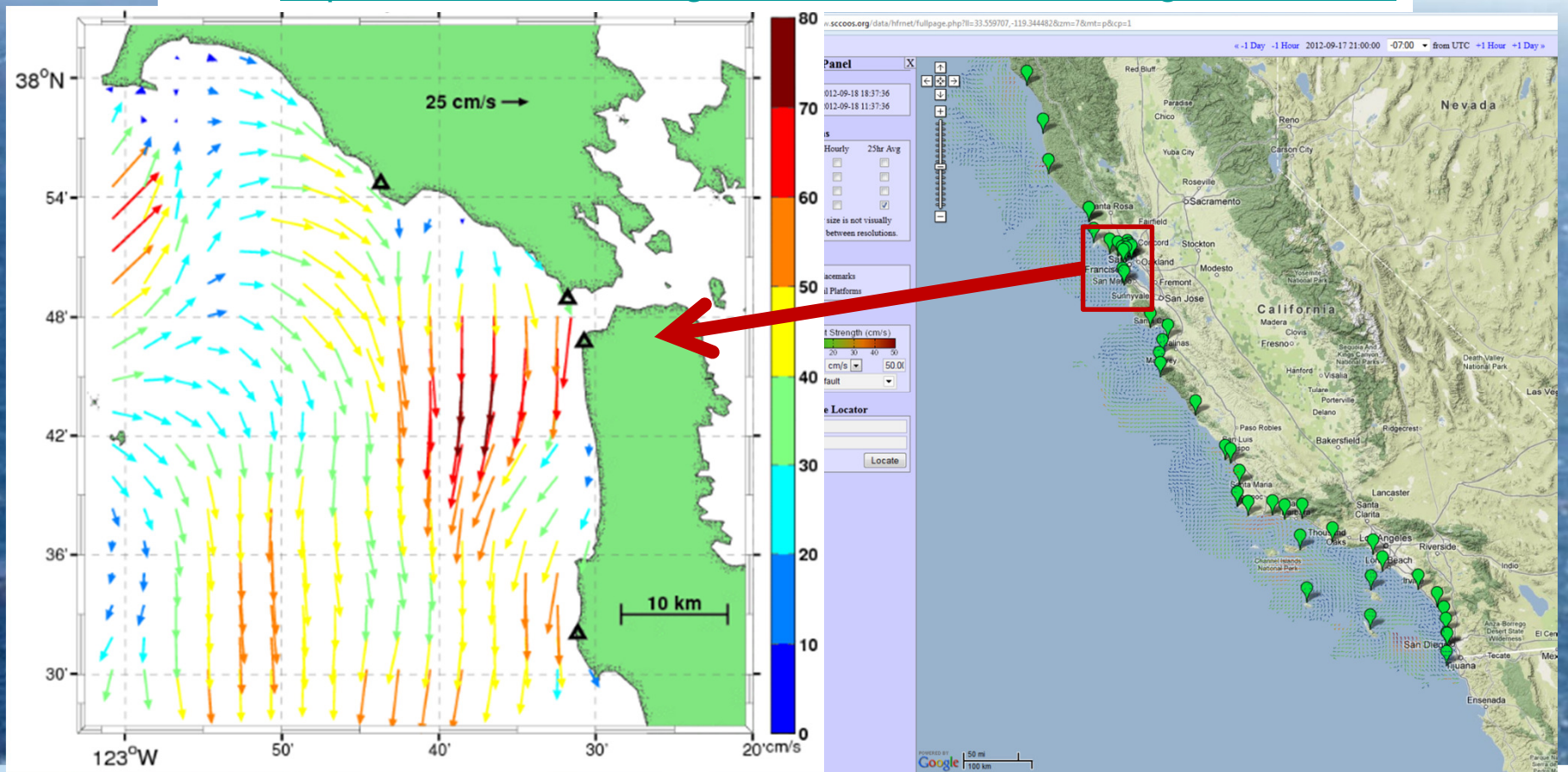


Sept. 24, 2012



Ocean Surface Current Mapping with High-Frequency Radar

http://www.cencoos.org/sections/conditions/Google_currents/



Sept. 24, 2012



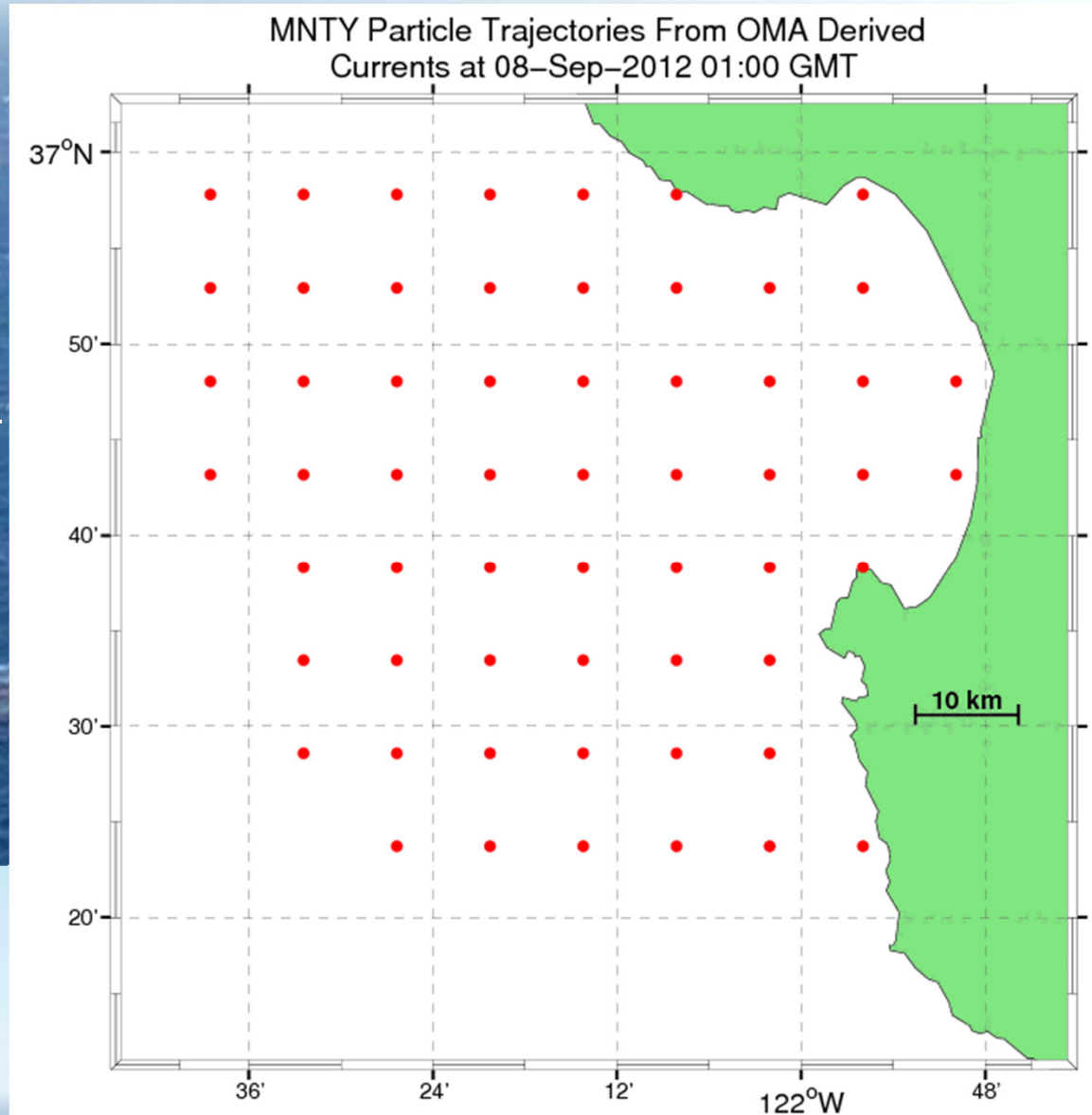
A variety of hindcast, forecast, and daily average current products, and archived data, are available from CeNCOOS surface currents page: <http://www.cencoos.org/sections/conditions/currents/index.shtml>

and from CeNCOOS HF radar current operator pages:

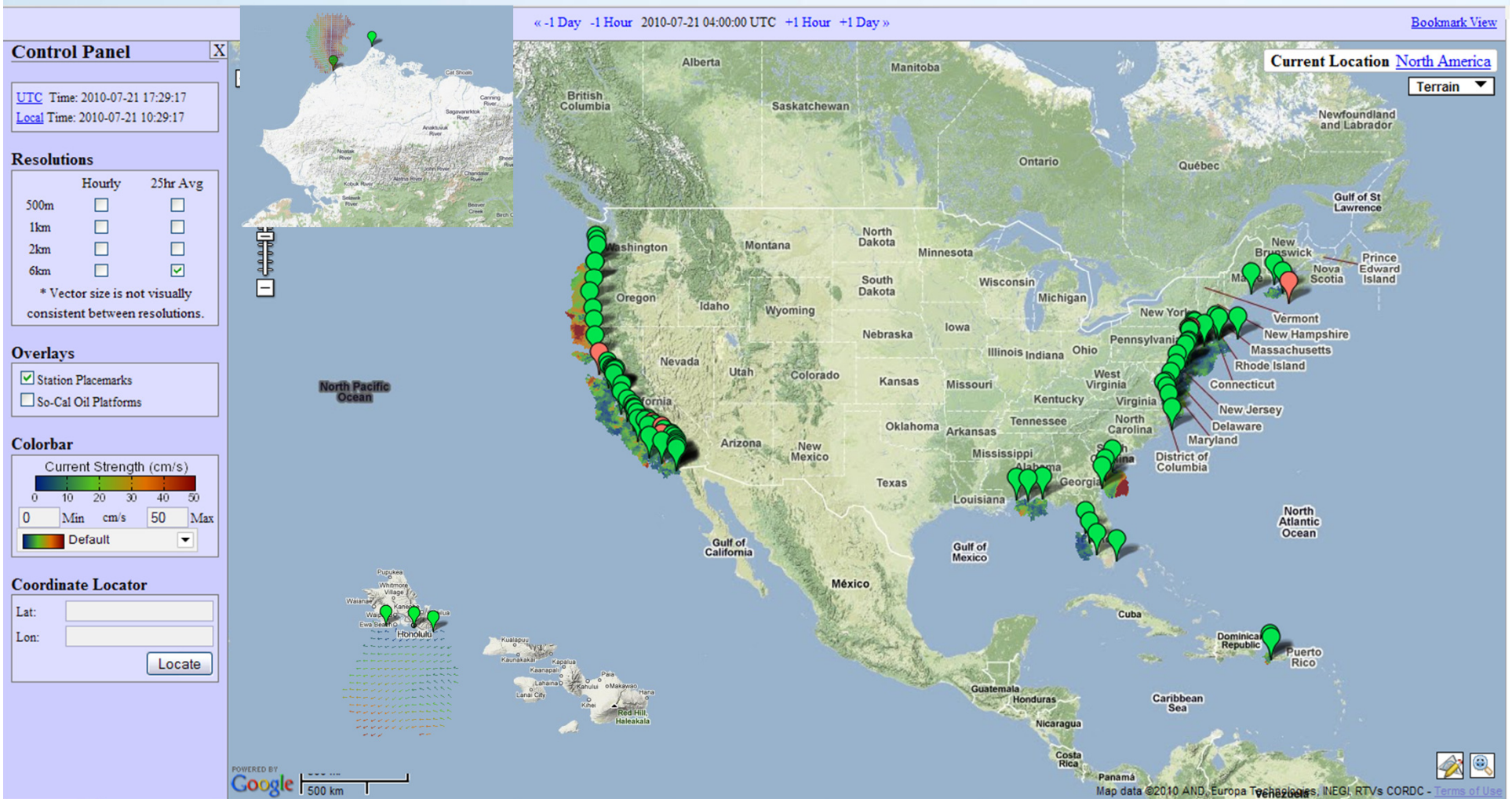
<http://www.cencalcurrents.org/>

<http://www.norcalcurrents.org/COAMP/index.html>

<http://bml.ucdavis.edu/boon/currents.html>



<http://www.sccoos.org/data/hfrnet/>



Numerical Ocean Models

- 1-2 km resolution models in Monterey Bay and Southern CA Bight
- 3 km resolution model covering ocean off all of California
- 12 km resolution model running for area off whole West Coast
- Drop-a-drifter tool
- Virtual moorings
- Coupled physical-ecosystem models under development

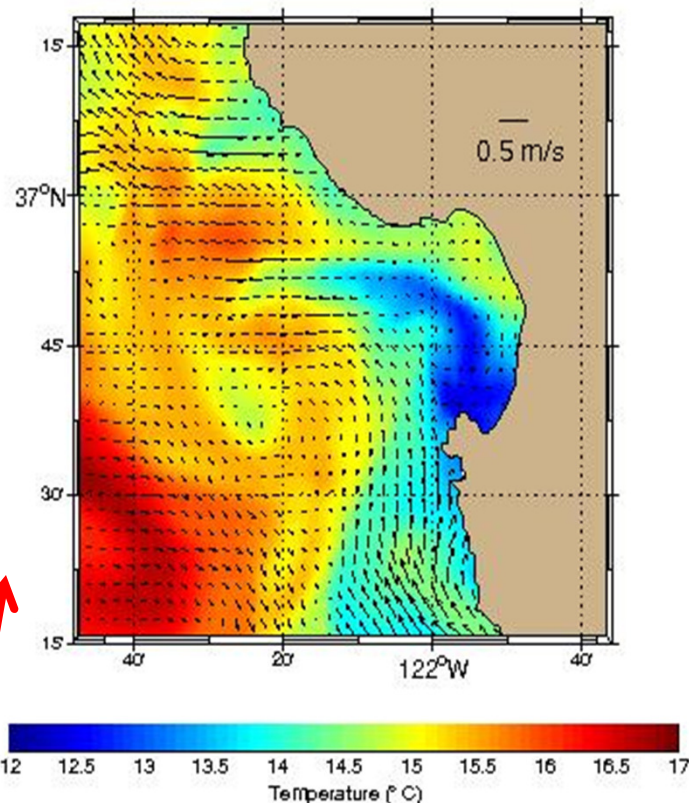


Sept. 24, 2012



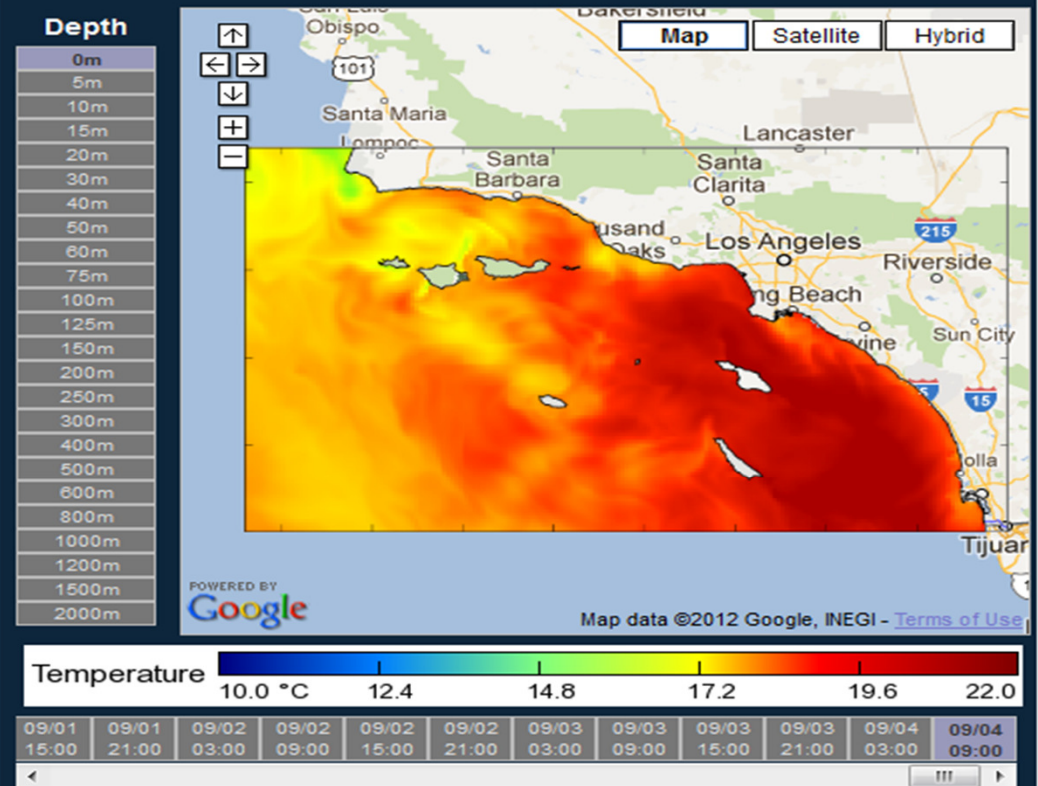
1-2 km resolution models in Monterey Bay and Southern CA Bight

Temp (°C, color), Current (m/s, arrows) at 0m for 11/06/2010 at 3GMT



Regional Ocean Model System (ROMS) Model Output

The ROMS model is produced and distributed by NASA JPL and is available from <http://ocean.jpl.nasa.gov/SCB/>.



<http://www.cencoos.org/sections/models/ROMS.shtml>

<http://www.sccoos.org/data/roms/>

Enable ROMS Layer ☒

ROMS Temperature ☒

ROMS Salinity ☐

ROMS Sea Surface Height ☐

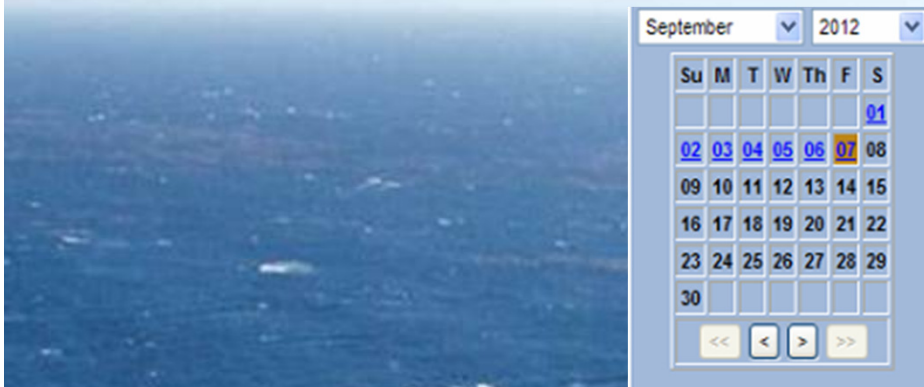
ROMS Ocean Currents ☐

Enable Bathymetry Layer ☐

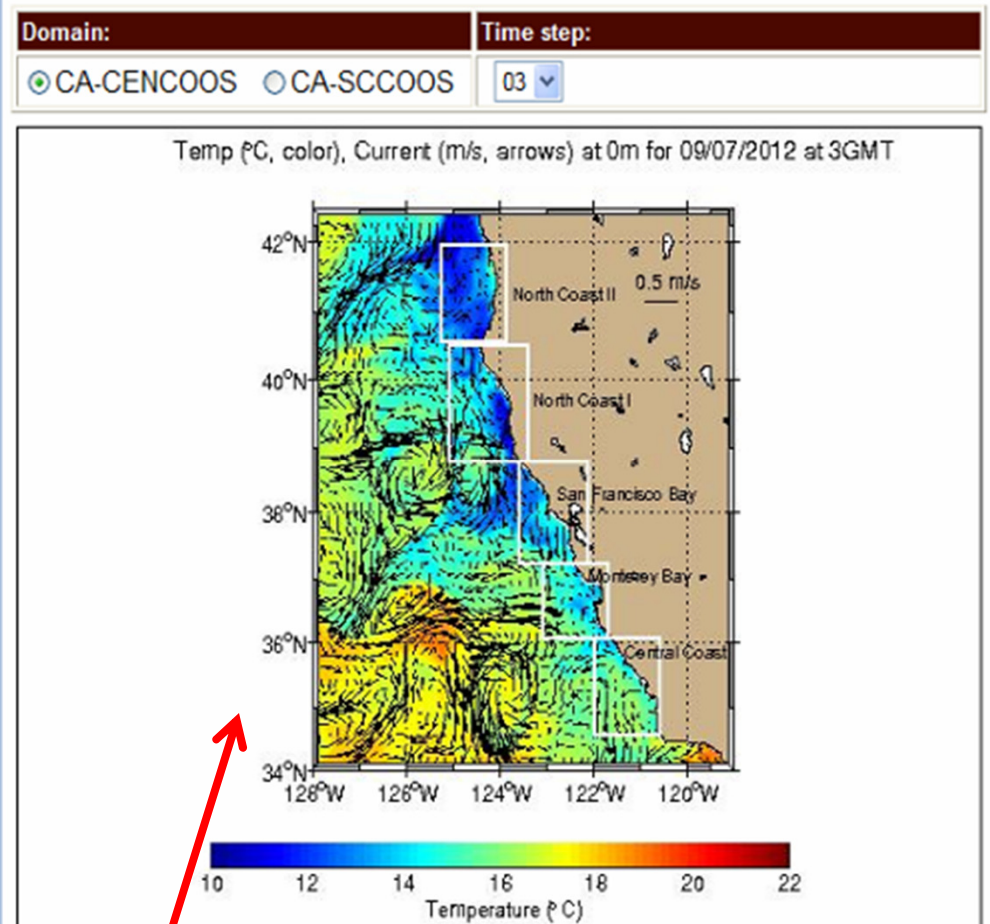
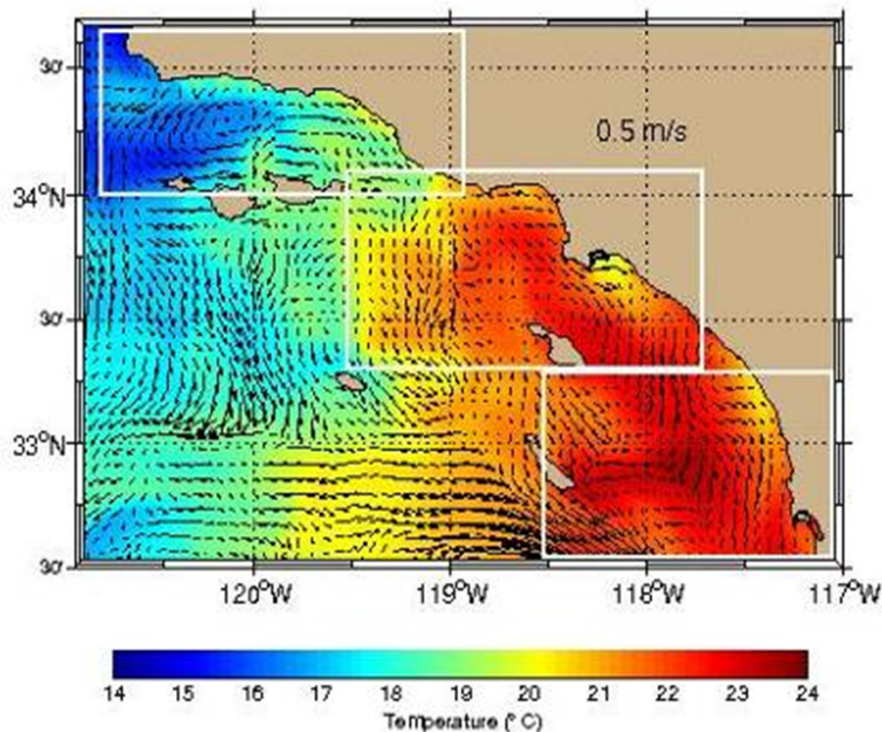
	From	To
Latitude		
Longitude		
Depth (m)	0	125

3 km resolution model covering ocean off all of CA

<http://ourocean.jpl.nasa.gov/CA/>



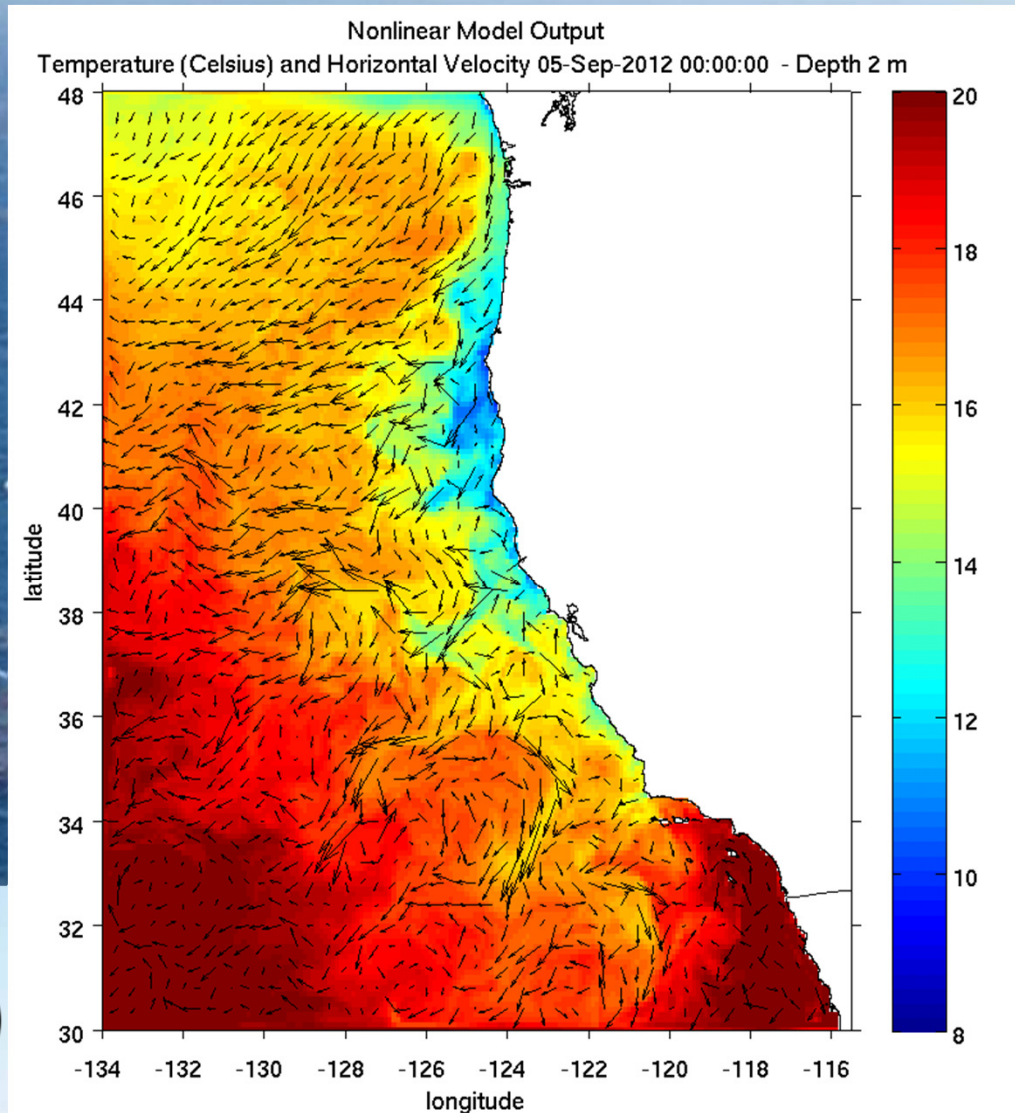
Temp (°C, color), Current (m/s, arrows) at 0m for 09/07/2012 at 3GMT



ROMS Nowcast - Temperature

12 km resolution model for whole West Coast

http://www.cencoos.org/sections/models/UCSC_ROMS.shtml



"Drop-a-Drifter" Surface Water Trajectories

http://www.cencoos.org/sections/products/drop_a_drifter.shtml

<http://ocean.jpl.nasa.gov/SCB/scbmangen.jsp>

If you wish to determine the origin of something found floating or on the beach, please use the multiple drop mode and: select an end time of whenever it was found and a start time previous to the end time, then drop multiple drifters over a large area to see the most likely origin.

☐ Single Drop Mode ☒ Multiple Drop Mode
(Click & then move the mouse to draw a region for drifters)

Number Of Drifters:

X dimension: Y dimension:

Location

Lon: Lat:

Data Source

ROMS 72hr Forecast

Start Time (GMT)

2012-09-06 03:00:00

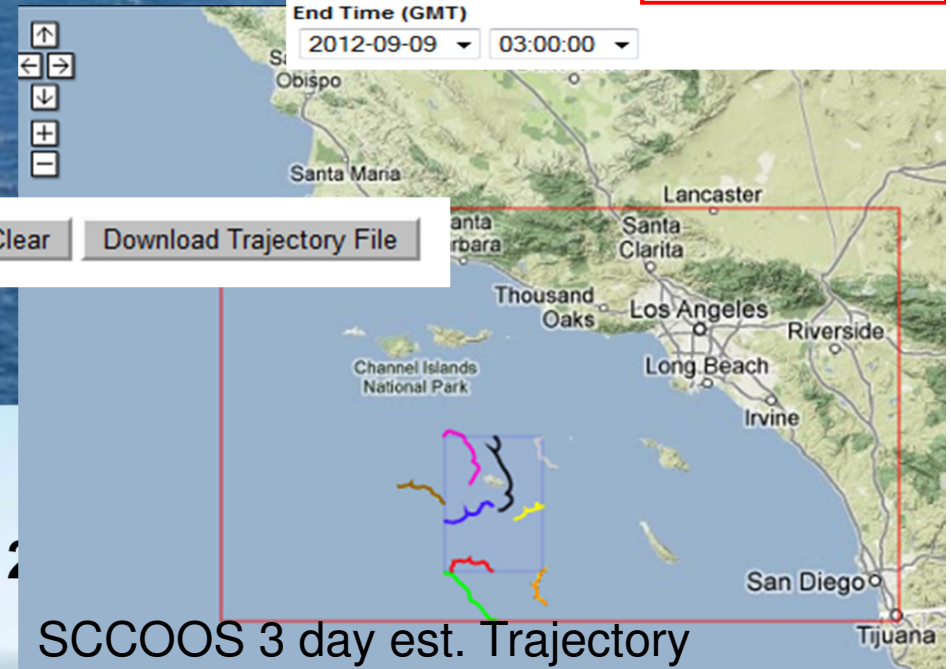
End Time (GMT)

2012-09-09 03:00:00

Parameters



CeNCOOS 3 day est. Trajectory



SCCOOS 3 day est. Trajectory

SCCOOS Virtual Moorings

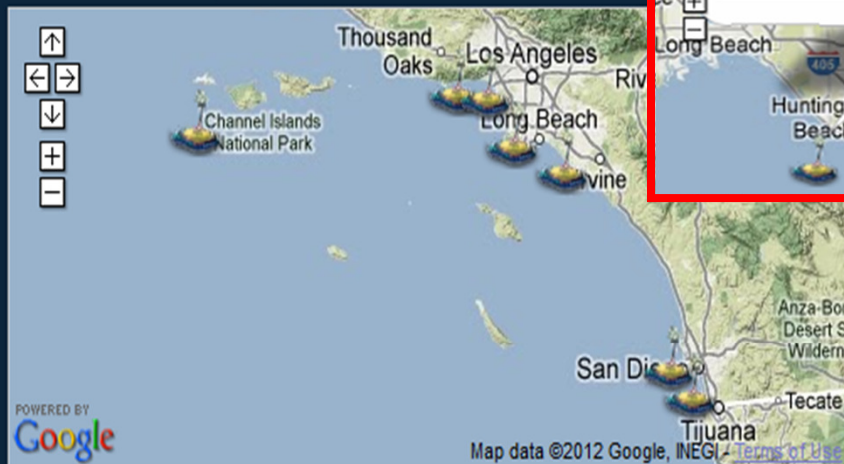
<http://www.sccoos.org/data/roms/virtual/>

Virtual Moorings

ROMS Model Output

UTC Time: 2012-09-06 18:07:16

Local Time: 2012-09-06 11:07:16



[Bookmark Page](#)

Site Name

Location

CalCOFI Line 55, Station 33	33.7500	-120.4100
Hyperion Outfall	33.9120	-118.5215
Near LACSD Outfall	33.7000	-118.3400
OCSD Outfall	33.5747	-118.0108
Point Loma Outfall	32.6657	-117.3248
South Bay Ocean Outfall	32.5367	-117.1850
Santa Monica SMBO Mooring	33.9333	-118.7167

ROMS Model Output

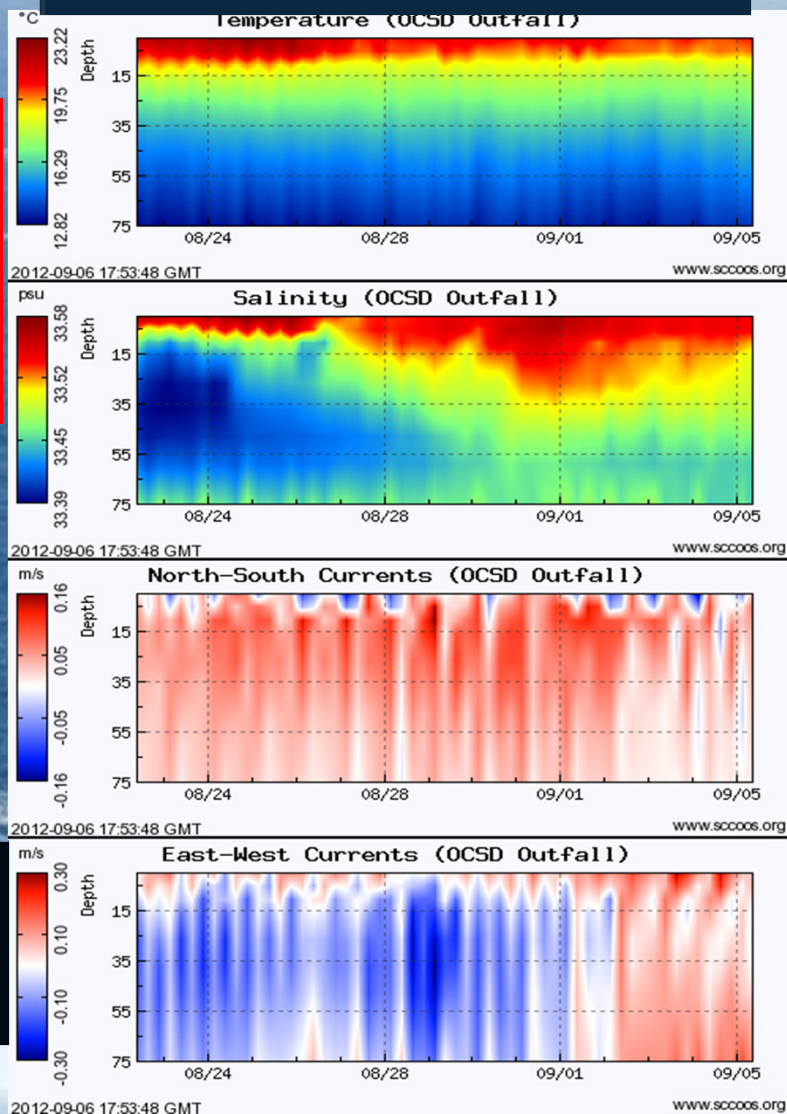
[Recent Model Runs](#)

[Virtual Moorings](#)

[Drifter Trajectory](#)

Recent Profiles:

[2 Week](#) [1 Month](#) [3 Month](#) [6 Month](#) [1 Year](#) [Full Set](#)



Biological and geochemical forecast models under development or consideration

- Statistical models relating ocean conditions to HABs
- Linked hydrologic, ocean, atmosphere models to forecast salmon populations
- Coupled physical/NPZD (nitrogen, phytoplankton, zooplankton, detritus) models for ecosystem forecasts
- Geochemical modeling to identify natural and outfall-based sources of nutrients



Sept. 24, 2012



Lunch...Yum!



**Meet Back in This Room in
1 Hour, Thank you!**

